



AIR MEASUREMENT SERVICES, INC.

Horizon Test #: W07-035-FRB

Date Tested: April 22, 2003

Report Date: May 15, 2003

Revision Number: 0

**ANNUAL EMISSIONS TEST
OF LANDFILL GAS FLARE #2
BRADLEY LANDFILL**

Permit to Operate F27480

Prepared for:

Waste Management Recycling and
Disposal Services of California, Inc.
9081 Tujunga Avenue, 2nd Floor
Sun Valley, California 91352

Prepared by:

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Regulatory Agency:

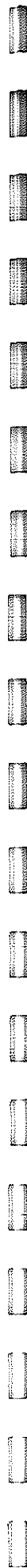
South Coast Air Quality Management District
21865 East Copley Drive
Diamond Bar, California 91765

A handwritten signature in black ink that reads "Scott H. Bunch".

Scott H. Bunch
Project Manager

A handwritten signature in black ink that reads "Richard J. Vacherot".

Richard J. Vacherot
Technical Director



HORIZON

AIR MEASUREMENT SERVICES, INC.

May 15, 2003

Mr. Bruce Matlock
Bradley Landfill and Recycling Center
9227 Tujunga Avenue
Sun Valley, California 91352

Dear Mr. Matlock

Please find enclosed three copies of the final report entitled "Annual Emissions Test of Landfill Gas Flare".

If you have any questions please call me at (805) 498-8781.

Sincerely,

HORIZON AIR MEASUREMENT SERVICES, INC.

Scott H. Bunch
Scott H. Bunch
Project Manager

SB:rt

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1. INTRODUCTION

Under the Bradley Landfill and Recycling Center (BLRC) site specific Rule 1150.1 compliance plan, Waste Management Recycling and Disposal Services of California, Inc. is required to conduct an annual source test on landfill gas Flare #2 located at BLRC (Permit to Operate # F27480). Horizon Air Measurement Services, Inc. (Horizon) had been retained for this purpose.

All testing/analytical procedures conformed to those outlined in Horizon Test Plan No. W07-013-TP, which had been previously approved by the South Coast Air Quality Management District (SCAQMD). Horizon completed the source testing on April 22, 2003.

Two samples were taken for each parameter of interest (Table 1-1) during each test day with the exception of trace organic compounds and reduced sulfur compounds, for which only one sample per location was collected. The results of the testing program, with respect to Permit limits, are provided in Section 2 - Results Summary.

A brief description of the flare and flare operating conditions during testing is provided in Section 3. Section 4 provides a summary of sampling/analytical procedures utilized. Section 5 provides a more detailed results summary/discussion.



Table 1-1
Compounds of Interest - Flare #2
Waste Management - Bradley Landfill
April 22, 2003

Parameter	Location	Method	Number of Samples Per Source
Total Non Methane Hydrocarbons	Inlet	SCAQMD Method 25.1	2
	Outlet	SCAQMD Method 25.3	2
Reduced Sulfur Compounds (C ₁ -C ₃) Including H ₂ S	Inlet	SCAQMD Method 307.91 Equivalent	1
Speciated Organic Compounds	Inlet	Whole Air/GC-MS (1150 list)	1
	Outlet	Whole Air/GC-MS (1150 list)	1
Particulate Matter	Outlet	SCAQMD Method 5.1	2
Oxides of Nitrogen	Outlet	SCAQMD Method 100.1	2
Carbon Monoxide	Inlet	SCAQMD Method 25.1	2
	Outlet	SCAQMD Method 100.1	2
Oxygen	Inlet	SCAQMD Method 25.1	2
	Outlet	SCAQMD Method 100.1	2
Carbon Dioxide	Inlet	SCAQMD Method 25.1	2
	Outlet	SCAQMD Method 100.1	2
Methane	Inlet	SCAQMD Method 25.1	2
	Outlet	SCAQMD Method 25.3	2
Flow Rate/Temperature	Inlet	SCAQMD Method 2.3	2
	Outlet	SCAQMD Method 5.1/Calculated	2
Moisture	Outlet	SCAQMD Method 5.1	2
	Inlet	SCAQMD Method 4.1	2
BTU Content	Inlet	SCAQMD Method 25.1	2



2. SUMMARY OF RESULTS

The results of the testing program conducted on Flare #2 are provided in Table 2-1. Emission rates of oxides of nitrogen, carbon monoxide, total particulate matter, total non-methane organics and total sulfur compounds (as SO₂) were within Permit limitations. A more detailed discussion of results is provided in Section 5.

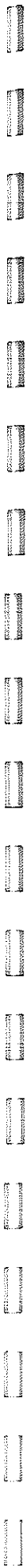


Table 2-1
Summary of Results
Waste Management - Bradley Landfill
Flare #2
April 22, 2003

Parameter	Measured Emission Rate*	Permitted Emission Rate
Inlet Gas Flow Rate	1751 dscfm	2083 cfm
Oxides of Nitrogen, as NO ₂	1.07 lb/hr 0.034 lb/MMBtu	2.58 lb/hr, 0.06 lb/MMBtu
Total Particulate Matter	0.13 lb/hr	1.31 lb/hr
Carbon Monoxide	< 1.07 lb/hr	2.37 lb/hr
Total Non Methane Organics, as CH ₄	0.072 lb/hr	0.66 lb/hr
Total Non Methane Organics, as C ₆	0.72 ppm C ₆ @ 3% O ₂	20 ppm C ₆ @ 3% O ₂ (Rule 1150.1)
Total Sulfur Compounds, as SO ₂	0.76 lb/hr	3.16 lb/hr

* Measured emission rates shown are the average of two test runs (samples).

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3. FLARE DESCRIPTION AND OPERATION

3.1 Flare Description

The landfill gas flare consists of an insulated steel cylinder 50 feet high and 96 inches inside diameter (see Figure 3-1). Operating flow rate is limited, by the Permit, to 2083 cubic feet per minute (3,000,000 cf/day). Landfill gas flow rate was continuously monitored and recorded on a strip chart by the facility. Flare operating temperature during the test was set at 1600 °F. Flare temperature was continuously monitored by the facility.

Condensate flow rate is limited to five gallons per minute by the Permit. The source test was conducted at a condensate flow rate of approximately 1.1 gallons per minute.

Strip chart records of the flare operating conditions during testing are provided in Appendix G.

3.2 Sample Location

Flare exhaust samples were obtained from each of two ports positioned at right angles, located five feet from the top of the flare and approximately 45 feet above ground level.

Inlet samples were obtained from the 10-inch diameter (ID) landfill gas line supplying the flare at least two diameters downstream and at least one diameter upstream of any flow disturbance.

3.3 Flare Operation During Testing

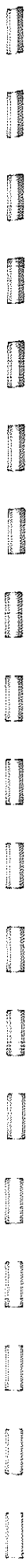
The flare was operated under the following conditions during the source test period:

Landfill gas flow - 1,697 scf/minute

Flare temperature - 1,590° F

Condensate flow - 1.1 gallons per minute

The facility strip chart recordings of these parameters is included in Appendix G, Process



TOTAL DIAMETER = 96" ID.
TOTAL HEIGHT = 50'

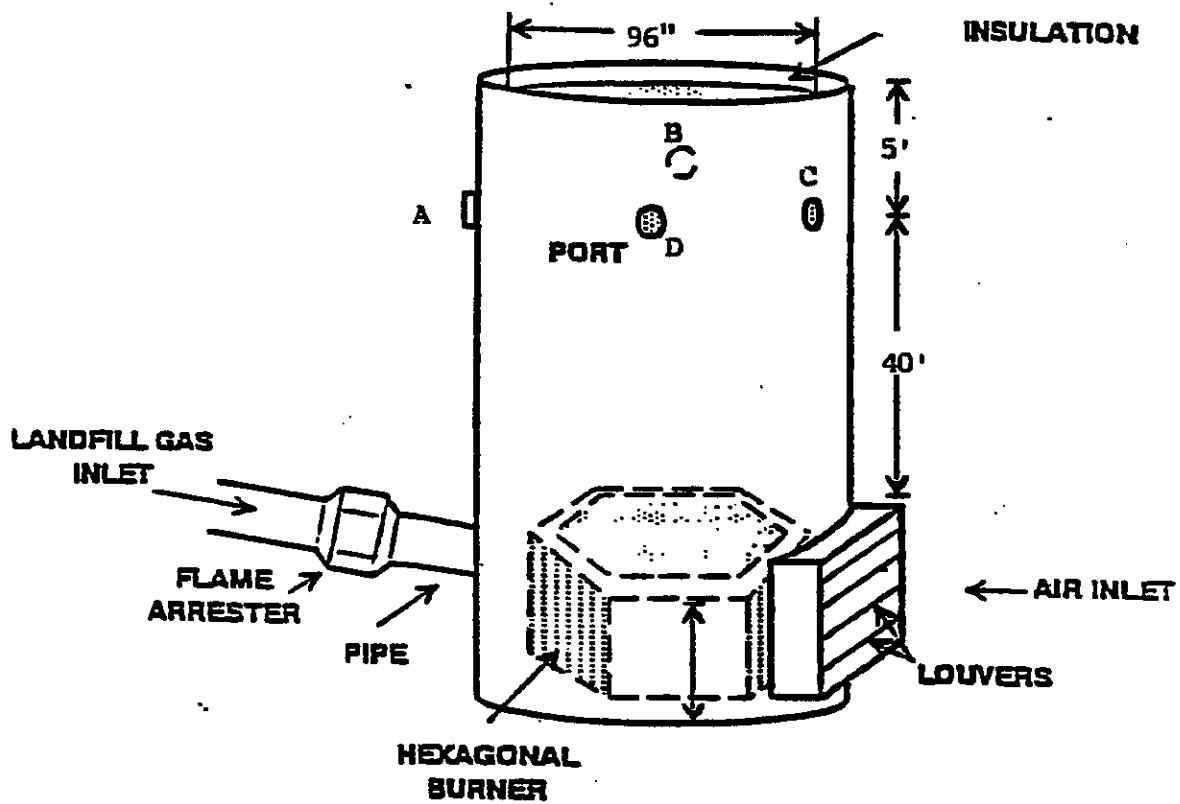


Figure 3-1

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4. SAMPLING/ANALYSES

The sampling/analytical program had been designed to quantify the parameters of interest outlined in Table 1-1.

4.1 Sample Location

4.1.1 Flare Exhaust

At the flare exhaust 24 sample points (12 per diameter), determined in accordance with Method 1, were utilized for the determination of the following compounds:

- particulate matter
- NO_x
- CO
- O₂/CO₂
- flow rate
- moisture

The exact locations of the sampling points are provided in Appendix D, Field Data Sheets. A description of SCAQMD Method 1.1 is provided in Appendix A.

One sample points at the center of the stack was utilized for the collection of the following compounds:

- speciated organic compounds
- total non methane hydrocarbons
- methane



4.1.2 Landfill Gas Supply Line

Eight sample points, chosen in accordance with SCAQMD Method 1.1, were used to gather velocity data.

A single sample point was utilized for the collection of the following compounds:

- total non methane hydrocarbons
- methane
- CO
- CO₂/O₂
- reduced sulfur compounds
- speciated organic compounds
- BTU content
- moisture

4.2 Moisture

4.2.1 Inlet - SCAQMD Method 4.1

Landfill gas moisture content was determined using SCAQMD Method 4.1. Two, one hour test runs were conducted in conjunction with the outlet particulate and SCAQMD Method 100.1 testing. A description of SCAQMD Method 4.1 is provided in Appendix A.

4.2.2 Outlet - SCAQMD Method 5.1

Moisture content of the flare exhaust was determined using SCAQMD Method 4.1 in conjunction with SCAQMD Method 5.1, as detailed in Appendix A.

4.3 Flow Rate

4.3.1 Inlet

Landfill gas flow rate was determined using SCAQMD Method 2.3. A description of SCAQMD Method 2.3 is provided in Appendix A.



4.3.2 Outlet - SCAQMD Method 5.1

The landfill flare flow rate was monitored in conjunction with SCAQMD Method 5.1, as detailed in Appendix A. However, since the flare exhaust velocity was below the applicable limit (0.05 in. WG ΔP) of SCAQMD Method 2.1/5.1, the exhaust flow rate was calculated stoichiometrically based upon the landfill gas composition and stack dilution.

4.4 Particulate Matter (Outlet) - SCAQMD Method 5.1

Horizon conducted two, 60-minute test runs on the flare exhaust for particulate matter determination in accordance with SCAQMD Method 5.1 protocol. Twenty-four traverse points were utilized for the collection of particulate matter at the flare exhaust. A description of SCAQMD Method 5.1 is provided in Appendix A. Stack gases were withdrawn through an integral quartz nozzle and probe.

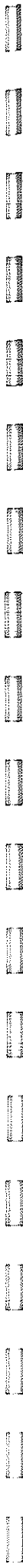
4.5 Oxides of Nitrogen, Carbon Monoxide, Carbon Dioxide, Oxygen (Continuous Emissions Monitoring) - SCAQMD Method 100.1

Two, 60-minute test runs were conducted at the flare exhaust. Twenty-four sample points were utilized. All sampling was performed under the guidelines of SCAQMD Method 100.1 as detailed in Appendix A.

4.6 Hydrogen Sulfide (H₂S), and C₁ - C₃ Sulfur Compounds (Inlet) - SCAQMD Method 307.91 Equivalent

Hydrogen sulfide and C₁ - C₃ sulfur compound samples were collected at the inlet of the flare using the Tedlar bag collection system depicted in Appendix A. All system components coming in contact with the landfill gas were Teflon.

Hydrogen sulfide and C₁ - C₃ sulfur compounds were analyzed using a Method 307.91 equivalent by AtmAA, Inc. Equivalency had been formally granted by SCAQMD to AtmAA, Inc. for this Method.



4.7 Speciated Organic Compounds - SCAQMD Rule 1150.1 List

4.7.1 Inlet

Speciated organic compounds were collected at the flare inlet of the landfill gas using the Tedlar bag collection system depicted in Appendix A. All system components coming in contact with the landfill gas were Teflon or stainless steel. Speciated organic compounds (SCAQMD Rule 1150.1 list) were identified and quantified using GC/MS analytical procedures.

4.7.2 Outlet

Speciated organic compound samples were collected in conjunction with the particulate/CEM testing at the outlet using Tedlar bag method as depicted in Appendix A. Each sample was then analyzed for speciated organic compounds (SCAQMD Rule 1150.1 list) using GC/MS procedures.

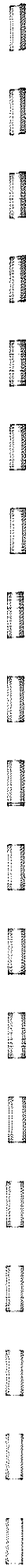
4.8 Total Non Methane Hydrocarbons, Methane, Carbon Dioxide and Carbon Monoxide

4.8.1 Inlet - SCAQMD Method 25.1

Total non methane hydrocarbons, methane, CO₂ and CO concentration were determined at the flare inlet from duplicate samples using SCAQMD Method 25.1. A description of SCAQMD Method 25.1 is provided in Appendix A.

4.8.2 Outlet - SCAQMD Method 25.3

Duplicate samples were obtained for total non methane hydrocarbon and methane concentration determination using SCAQMD Method 25.3. A description of SCAQMD Method 25.3 is provided in Appendix A.



5. RESULTS DISCUSSION

Detailed results of the criteria testing conducted on Flare #2 on April 22, 2003 are presented in Table 5-1. Speciated organic compound destruction efficiencies and emission rates are provided in Table 5-2.

Since the flare exhaust velocity was below the applicable range (>0.05 ΔP inches water gauge) of SCAQMD Method 2.1, the flare exhaust flow rate for each test run was calculated stoichiometrically based upon the composition of the landfill gas and the exhaust stack dilution. Oxide of sulfur emission rate was calculated based upon the landfill gas total sulfur compound concentration and flow rate (see Appendix B).

No sampling or analytical problems or Method deviations were encountered during any phase of the test program.



Table 5-1
Summary of Results
Waste Management - Bradley Landfill
Flare #2
April 22, 2003

	LANDFILL GAS			FLARE EXHAUST		
Run Number	1	2	Avg.	1	2	Avg.
STACK GAS CHARACTERISTICS						
Temperature, degrees F	112	114	113	1658	1645	1651
Moisture, %	4.7	5.5	5.1	10.2	10.1	10.1
Flow Rate, acfm	2047	2054	2050			
Flow Rate, dscfm	1759	1743	1751	11543	* 12638	* 12091 *
Fixed Gases						
Oxygen, %	3.04	-	3.04	10.66	11.64	11.15
Carbon Dioxide, %	26.30	-	26.30	8.93	8.09	8.51
Methane, %	29.30	-	29.30	0.00	0.00	0.00
BTU Value, Btu/scf	296	-	296	-	-	-
EMISSIONS						
Oxides of Nitrogen						
ppm	-	-	-	13.1	11.3	12.2
ppm @ 3 % O2	-	-	-	22.9	21.9	22.4
lb/hr	-	-	-	1.100	1.043	1.071
lb/MMBtu	-	-	-	0.035	0.034	0.034
Carbon Monoxide						
ppm	-	-	-	< 20.0	< 20.0	< 20.0
ppm @ 3 % O2	-	-	-	< 35.0	< 38.6	< 36.8
lb/hr	-	-	-	< 1.02	< 1.12	< 1.07
lb/MMBtu	-	-	-	< 0.03	< 0.04	< 0.03
Total Particulate Matter						
gr/dscf	-	-	-	0.0013	0.0012	0.0013
lb/hr	-	-	-	0.13	0.13	0.13
Total Non-Methane Hydrocarbons (Reactive Organic Compounds)						
ppm, as Methane	2343	-	2343	2.34	-	2.34
lb/hr, as Methane	10.37	-	10.37	0.072	-	0.072
Sulfur Compounds						
Hydrogen Sulfide, ppm	42.2	-	42.2	> 0.50	-	> 0.50
Total Sulfur, ppm as H2S	43.0	-	43.0	-	-	-
Oxides of Sulfur**						
lb/hr	-	-	-	0.76	-	0.76

* Flow Rate calculated stoichiometrically

** Calculated from sulfur balance

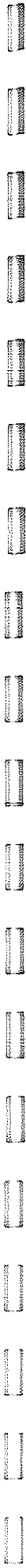
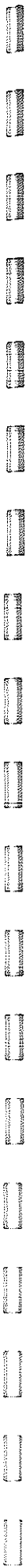


Table 5-2
Trace Organic Species
Destruction Efficiency Results
Waste Management - Bradley Landfill
Flare #2
April 22, 2003

Species	Inlet		Outlet		Destruction Efficiency (%)
	Concentration (ppb)	Emission Rate (lb/hr)	Concentration (ppb)	Emission Rate (lb/hr)	
Hydrogen Sulfide	45300	4.28E-01	< 500	< 3.26E-02	> 92.38
Benzene	963	2.08E-02	< 0.3	< 4.47E-05	> 99.78
Benzylchloride	< 40	< 1.41E-03	< 0.8	< 1.94E-04	NA
Chlorobenzene	279	8.73E-03	< 0.3	< 6.48E-05	> 99.26
Dichlorobenzenes	759	3.09E-02	< 1.1	< 3.09E-04	> 99.00
1,1-dichloroethane	121	3.32E-03	< 0.3	< 5.68E-05	> 98.29
1,2-dichloroethane	< 16	< 4.38E-04	< 0.3	< 5.68E-05	NA
1,1-dichloroethylene	< 16	< 4.30E-04	< 0.3	< 5.56E-05	NA
Dichloromethane	< 20	< 4.71E-04	< 0.3	< 4.87E-05	NA
1,2-dibromoethane	< 16	< 8.32E-04	< 0.3	< 1.08E-04	NA
Perchloroethene	613	4.02E-02	1.46	6.61E-04	98.36
Carbon tetrachloride	< 20	< 8.53E-04	< 0.2	< 5.89E-05	NA
Toluene	3670	9.35E-02	0.96	1.69E-04	99.82
1,1,1-trichloroethane	< 16	< 5.89E-04	< 0.2	< 5.08E-05	NA
Trichloroethene	200	7.25E-03	< 0.2	< 5.01E-05	> 99.31
Chloroform	< 16	< 5.27E-04	< 0.2	< 4.55E-05	NA
Vinyl Chloride	454	7.85E-03	< 0.3	< 3.58E-05	> 99.54
m xylenes	11700	3.43E-01	< 0.5	< 1.01E-04	> 99.97
o+p xylene	3290	9.65E-02	< 0.3	< 6.08E-05	> 99.94
TNMHC	2343000	1.04E+01	2340	7.16E-02	99.31

Note: All values preceded by "<" are below the detection limit - reported values are detection limit values.
 NA--Not applicable: Destruction efficiency cannot be calculated since both inlet and outlet values are below the detection limit.



APPENDIX A - Sampling and Analytical Methods

Method:

Sample Velocity Traverses for Stationary Sources

Applicable for
Methods:

EPA Method 1, SCAQMD Method 1.1, CARB Method 1

Principle:

To aid in the representative measurements of pollutant emissions and/or total volumetric flow rate from a stationary source, a measurement site where the effluent stream is flowing in a known direction is selected, and the cross section of the stack is divided into a number of equal areas. A traverse point is then located within these equal areas. The method cannot be used when, 1) flow is cyclonic or swirling, 2) stack is small than about 0.30 meter (12 inches) in diameter or 3) the measurement of the site is less than two stack or duct diameters downstream or less than a half diameter upstream from the flow disturbance.

Method:

Stack Gas Velocity and Volumetric Flow Rate

Applicable for
Methods:

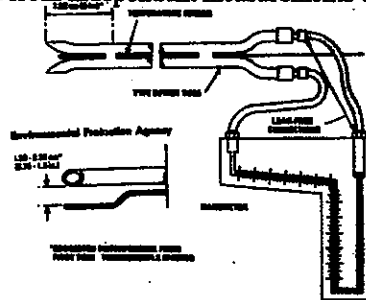
EPA Method 2, CARB 2, SCAQMD Method 2.1

Principle:

The average gas velocity in a stack gas is determined from the gas density and from measurement of the average velocity head with a type S or standard pitot tube.

Sampling Procedure:

Set up the apparatus as shown in the figure. Measure the velocity head and temperature at the traverse points specified by EPA Method 2, CARB Method 2 or SCAQMD Method 2.1. Measure the static pressure in the stack and determine the atmospheric pressure. The stack gas molecular weight is determined from independent measurements of O_2 , CO_2 and H_2O concentrations.



Sample Recovery:
and Analyses:

The stack gas velocity is determined from the measured average velocity head, the measured dry concentrations of O_2 and CO_2 and the measured concentration of H_2O . The velocity is determined from the following set of equations:

Where,

ΔP = velocity head, inches in H_2O
 T_s = gas/temperature, degrees R
 P_s = absolute static pressure

M_{wd} = dry molecular weight
 M_w = molecular weight
 C_p = pitot flow coefficient

Dry molecular weight of stack gas

$$M_{wd} = 0.44 (\%CO_2) + 0.32 (\%O_2) + 0.28 (\%N_2 + \%CO)$$

Molecular weight of stack gas, wet basis

$$M_w = (M_{wd} \times M_d) + 18 (1 - M_d)$$

$$\text{Where, } M_d = \frac{100 - Bws}{100}$$

Stack gas velocity

$$(V_s)_{avg.} = (5130) C_p \times \sqrt{\Delta P_{avg.}} \times \sqrt{T_s} \times \left(\frac{1}{P_s \times M_w} \right)^{1/2}$$

Applicable for
Methods:

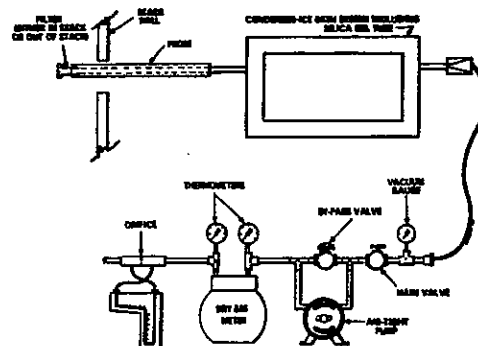
EPA Method 4, ARB 1-4, SCAQMD Method 4.1

Principle:

A gas sample is extracted at a constant rate from the source; moisture is removed from the stream and determined either volumetrically or gravimetrically.

Sampling Procedure:

Set up train as shown in the following figure. Sample is drawn at a constant rate through a sufficiently heated probe. The probe is connected to the impinger train by Teflon or glass tubing. The train consists of two greenburg smith impinger (SCAQMD 4.1) or one modified and 1 greenburg smith impinger (CARB & EPA) each containing 100 ml of water, an empty impinger as a knock-out and an impinger containing silica gel to protect the pump from moisture.



Sample Recovery:
and Analyses:

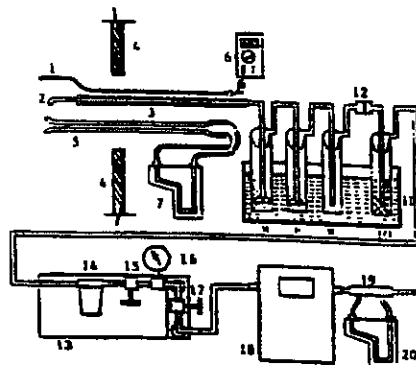
Following testing, moisture content is determined gravimetrically or volumetrically from initial and final impinger contents weights or volume.

Method: **Determination of Particulate Matter Emissions From Stationary Sources Using a Wet Impingement Train**

Reference: **SCAQMD Method 5.1**

Principle: Stack gas is withdrawn isokinetically from the source through a sample train. Particulate matter is collected in impingers containing deionized water and on a back-up filter. The impingers are contained in an ice bath to maintain a sampled gas temperature of approximately 15° C (60° F). The filter is not heated.

Sampling Procedure: The sampling train is shown in the figure below. The sample is drawn isokinetically through a glass or quartz probe (hi-temp). The probe is connected to an impinger train by Teflon tubing. The train consists of two Greenburg-Smith impingers which contain 100 ml of DI water; an empty impinger as a knock-out; and an impinger containing silica gel to protect the pump from moisture. Sample is withdrawn isokinetically from each predetermined sample point (determined using SCAQMD Method 1.1) through the sample train, which is followed by a vacuum line, a pump, a dry gas meter and a calibrated orifice.



- | | |
|--|---|
| 1. Temperature Sensor | 11. Ice Bath |
| 2. Nozzle | 12. Filter |
| 3. Glass Lined Stainless Steel Probe | 13. Sealed Pump (Leak Free) |
| 4. S-type Pitot Tube | 14. Filter for Pump |
| 5. Stack Wall | 15. Metering Valve |
| 6. Temperature Sensor Meter | 16. Vacuum Gauge |
| 7. Pitot Tube Inclined Manometer | 17. Bypass Valve |
| 8. Impinger with 100 ml H ₂ O | 18. Temperature Compensated Dry Gas Meter |
| 9. Empty Impinger | 19. Orifice |
| 10. Impinger with Silica Gel | |

Sample Recovery: The moisture content is determined either gravimetrically or volumetrically from initial and final impinger weights or volume. Then the filter, probe/impinger rinse (including nozzle rinse, liner rinse, impinger contents and rinses) and silica gel are recovered into Containers #1, #2 and #3, respectively.

Analytical Procedure: The aqueous sample is filtered through a tared fiberglass filter. An organic extraction is performed on the resulting solution using methylene chloride. Both the extraction filter and sample train filter are desiccated then measured gravimetrically. The organic extract and aqueous catch are evaporated, desiccated and measured gravimetrically.

If significant levels of sulfur compounds are present in the stack, each sample fraction is analyzed by acid-base titration for acid sulfate content and by barium-thorin titration for sulfate content.

Method:	Determination of Total Gaseous Non-Methane Organic Emissions as Carbon
Reference:	SCAQMD Method 25.1
Principle:	A sample of flue gas is drawn through a condensate trap and into an evacuated 12 liter tank. Volatile organic compounds (VOC), as total gaseous non-methane organics (TGNMO), are determined by combining results from independent analysis of condensate in the traps and gases in the tanks.
Sampling Procedure:	<p>Duplicate gas samples are withdrawn from a source at a constant rate through condensate traps immersed in dry ice followed by evacuated 12 liter (nominal) tanks. Heavy organic components condense as liquids and solids in the condensate traps. Lighter components pass as gases through the traps into the tanks. The combined results from tanks and trap analyses are used to determine a qualitative and quantitative expression of the effluent gas stream. Duplicate sampling is designed into the system to demonstrate precision.</p> <p>The sampling apparatus is checked for leaks prior to the sampling program by attaching the probe end to an absolute pressure gauge and vacuum pump in series. The sample lines were evacuated to less than 10 mm Hg and the gauge shutoff valve is then closed. The sample lines are deemed to be leak-free if no loss of vacuum occurs as indicated by the vacuum gauge. During sampling the tank pressures are monitored with a 0-30 inch vacuum gauge to ensure integrated sampling.</p> <p>The final vacuum of each sample is measured using a slack tube manometer. The sample is then pressurized to 800 mm Hg absolute with ultrapure nitrogen. Each sample is then analyzed using the SCAQMD TCA procedure for total non methane hydrocarbons.</p>
Analytical Procedure:	<p>Condensate traps are analyzed by first stripping carbon dioxide (CO₂) from the trap. The organic contents are then removed and oxidized to CO₂. This CO₂ is quantitatively collected in an evacuated vessel and measured by injection into a flame ionization detection/total combustion analysis (FID/TCA) system.</p> <p>The organic content of the sample fraction collected in each tank is measured by injecting a portion into the FID/TCA analysis system which uses a two phase gas chromatography (GC) column to separate carbon monoxide (CO), methane (CH₄) and carbon dioxide (CO₂) from each other and from the total gaseous non-methane organics (TGNMO) which are eluted as backflush. All eluted components are first oxidized to CO₂ by a hopcalite catalyst and then reduced to methane by a nickel catalyst. The resulting methane is detected using the flame ionization detector. A gas standard containing CO, CH₄, CO₂ and propane, traceable to NBS, is used to calibrated the FID/TCA analysis system.</p>

Method:

Determination of Total Gaseous Non-Methane Organic Emissions as Carbon

Reference:

SCAQMD Method 25.3

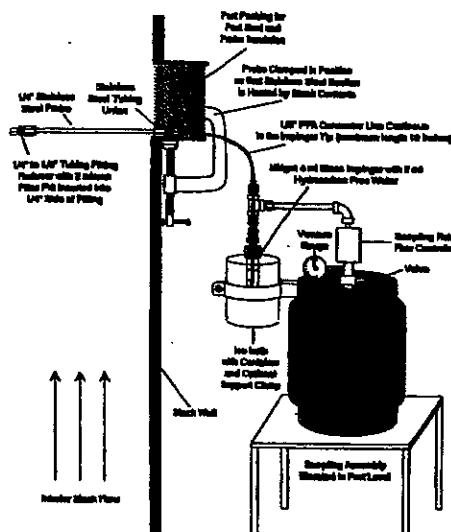
Principle:

A sample of flue gas is drawn through a condensate trap (mini-impinger) and into an evacuated six liter SUMMA canister. Volatile organic compounds (VOC), as total gaseous non-methane organics (TGNMO), are determined by combining results from independent analysis of condensate in the traps and gases in the SUMMA canisters.

Sampling Procedure:

Duplicate gas samples are withdrawn from a source at a constant rate through condensate traps immersed in an ice bath followed by evacuated six liter (nominal) SUMMA canisters. Heavy organic components condense as liquids and solids in the condensate traps. Lighter components pass as gases through the traps into the canisters. The combined results from canisters and mini-impinger analyses are used to determine a qualitative and quantitative expression of the effluent gas stream. Duplicate sampling is designed into the system to demonstrate precision.

The sampling apparatus is checked for leaks prior to the sampling program by capping the end of the sample probe. The sample flow valve is then opened and then closed to introduce vacuum to the system. The vacuum drop should then cease numerically above 10 in. Hg. A cease in movement of the vacuum gauge for a period of ten minutes indicates an acceptable leak check. When sampling is initiated, the vacuum gauge must indicate a canister vacuum of greater than 28 in. Hg. Immediately after sampling a post-test leak check is performed, followed by a rinse of the PFA line into the condensate trap with 0.5 to 1.0 ml of hydrocarbon free water.



Analytical Procedure:

Condensate traps are analyzed for total organic carbon by liquid injection into an infrared total organic carbon analyzer.

The organic content of the sample fraction collected in each canister is measured by injecting a portion into the FID/TCA analysis system which uses a two phase gas chromatography (GC) column to separate carbon monoxide (CO), methane (CH₄) and carbon dioxide (CO₂) from each other and from the total gaseous non-methane organics (TGNMO) which are eluted as backflush. All eluted components are first oxidized to CO₂ by a hopcalite catalyst and then reduced to methane by a nickel catalyst. The resulting methane is detected using the flame ionization detector. A gas standard containing CO, CH₄, CO₂ and propane, traceable to NBS, is used to calibrate the FID/TCA analysis system.

CONTINUOUS EMISSIONS MONITORING SYSTEM - TRUCK

SCAQMD Method 100.1

The continuous emissions monitoring system consists of a Thermo Electron Model 10AR chemiluminescence NO/NO_x analyzer, a Teledyne electro chemical O₂ analyzer, a Thermo Electron Model 48H CO gas filter correlation analyzer and a Horiba PIR 2000 non dispersive infrared CO₂ analyzer. All analyzer specifications are provided in Table 1. All concentrations are determined on a dry basis. Concentrations of NO_x, CO, O₂ and CO₂ are continuously recorded on a Linseis 10-inch strip chart recorder and a Strawberry Tree Data Acquisition System (DAS). The extractive monitoring system conforms with the requirements of SCAQMD Method 100.1.

The sampling probe (heated to 250°F), constructed of 1/2 inch-diameter 316 stainless steel, is connected to a condenser with a six foot length of 3/8 inch Teflon line (heated to 250°F). A Nupro stainless steel filter (10 micron) is connected at the tip of the probe and maintained at stack temperature.

The condenser consists of a series of two stainless steel moisture knock-out bottles immersed in an ice water bath. The system is designed to minimize contact between the sample and the condensate. Condensate is continuously removed from the knock-out bottles via a peristaltic pump. The condenser outlet temperature is monitored either manually at 10-minute intervals or on a strip chart recorder/DAS system. The sample exiting the condenser is then transported through a filter, housed in a stainless steel holder, followed by 3/8 inch O.D. Teflon tubing and a Teflon coated (or stainless steel/viton) diaphragm pump to the sample manifold. The sample manifold is constructed of stainless steel tubing and directs the sample through each of five rotameters to the NO_x monitor, O₂ monitor, CO monitor, CO₂ monitor and excess sample exhaust line, respectively. Sample flow through each channel is controlled by a back pressure regulator and by stainless steel needle valves on each rotameter. All components of the sampling system that contact the sample are composed of stainless steel, Teflon or glass.

The calibration system is comprised of two parts: the analyzer calibration and the system bias check. The calibration gases are, at a minimum, certified to $\pm 1\%$ by the manufacturer. Where necessary to comply with the reference method requirements, EPA Protocol 1 gases are used. The cylinders are equipped with pressure regulators which supply the calibration gas to the analyzers at the same pressure and flow rate as the sample. The selection of zero, span or sample gas directed to each analyzer is accomplished by operation of the zero, calibration or sample selector knobs located on the main flow control panel.

For SCAQMD Method 100.1 testing, the following procedures are conducted before and after each series of test runs:

Leak Check:

The leak check is performed by plugging the end of the sampling probe, evacuating the system to at least 20 inches of Hg. The leak check is deemed satisfactory if the system holds 20 inches of Hg vacuum for five minutes with less than one inch Hg loss.

Linearity Check:

The NO_x, CO, CO₂ and O₂ analyzers linearity check is performed by introducing, at a minimum, zero gas, mid range calibration gas (40-60% scale) and high range calibration gas (80-100% scale). Instrument span value is set on each instrument with the mid range gas. The high range calibration gas (80-100% scale) is then introduced into each instrument without any calibration adjustments. Linearity is confirmed, if all values agree with the calibration gas value to within 2% of the range.

Stratification Check:

A stack stratification check is performed (pre-test only) by traversing the stack comparing four traverse points to the reference point (center). If the gas composition is homogenous, <10% variation between any traverse points in the gas stream and the reference point. Single point gas sampling is performed at the reference point. If stratification exceeds the 10% criteria, then the stack cross section is traversed during sampling.

System Bias Check:

The system bias check is accomplished by transporting the same gases used to zero and span the analyzers to the sample system as close as practical to the probe inlet. This is accomplished by opening a valve located on the probe, allowing the gas to flow to the probe and back through the moisture knockout and sample line to the analyzers. During this check the system is operated at the normal sampling rate with no adjustments. The system bias check is considered valid if the difference between the gas concentration exhibited by the measurement system which a known concentration gas is introduced at the sampling probe tip and when the sample gas is introduced directly to the analyzer, does not exceed $\pm 5\%$ of the analyzer range.

Response Time:

Response time (upscale and downscale) for each analyzer is recorded during the system bias check. Upscale response time is defined as the time it takes the subject analyzer gas to reach 95% of the calibration gas value after introducing the upscale gas to the sample bias calibration system. Downscale response time is defined as the time it takes the subject analyzer to return to zero after the zero gas is introduced into the sample system bias calibration system.

NO_x Conversion Efficiency

The NO_x analyzer NO₂ conversion efficiency is determined by injecting a NO₂ gas standard directly into the NO_x analyzer (after initial calibration). The analyzer response must be at least 90% of the NO₂ standard gas value.

NO₂ Converter Efficiency (alternate method)

The mid level NO gas standard is directly injected into a clean leak-free Tedlar bag. The bag is then diluted 1:1 with air (20.9 % O₂). The bag is immediately attached to the NO_x sample line. The initial NO_x concentration is recorded on the strip chart. After at least 30 minutes the Tedlar bag is reattached to the NO_x sample line. Analyzer response must be at 98% of the initial Tedlar bag NO_x value to be acceptable.

In between each sampling run the following procedures are conducted:

Zero and Calibration Drift Check:

Upon the completion of each test run, the zero and calibration drift check is performed by introducing zero and mid range calibration gases to the instruments, with no adjustments (with the exception of flow to instruments) after each test run. The analyzer response must be within $\pm 3\%$ of the actual calibration gas value.

Analyzer Calibration:

Upon completion of the drift test, the analyzer calibration is performed by introducing the zero and mid range gases to each analyzer prior to the upcoming test run and adjusting the instrument calibration as necessary.

System Bias Check

(same as above)

A schematic of the sample system and specific information of the analytical equipment is provided in the following pages.

TABLE 1**CONTINUOUS EMISSIONS MONITORING LABORATORY - TRUCK****NO_x CHEMILUMINESCENT ANALYZER -- THERMO ELECTRON MODEL 10 A**

Response Time (0-90%)	1.5 sec -- NO mode/1.7 sec -- NO _x mode
Zero Drift	Negligible after 1/2 hour warmup
Linearity	$\pm 1\%$ of full scale
Accuracy	Derived from the NO or NO ₂ calibration gas, $\pm 1\%$ of full scale
Operating Ranges (ppm)	2.5, 10, 25, 100, 250, 1000, 2500, 10000
Output	0-1 volt

O₂ ANALYZER, FUEL TYPE -- TELEDYNE MODEL 326RA

Response Time (0-90%)	60 seconds
Accuracy	$\pm 1\%$ of scale at constant temperature $\pm 1\%$ of scale of $\pm 5\%$ of reading, whichever is greater, over the operation temperature range.
Operating Ranges (%)	0-5, 0-25
Output	0-1 volt

O₂ ANALYZER, PARAMAGNETIC -- SERVOMEX MODEL 1400B

Response Time (0-90%)	15 seconds
Accuracy	0.1% oxygen
Linearity	$\pm 1\%$ scale
Operating Ranges (%)	0-25, 0-100
Output	0-1 volt

CO GAS FILTER CORRELATION -- THERMO ELECTRON MODEL 48H

Response Time (0-95%)	1 minute
Zero Drift	± 0.2 ppm CO
Span Drift	Less than 1% full scale in 24 hours
Linearity	$\pm 1\%$ full scale, all ranges
Accuracy	± 0.1 ppm CO
Operating Ranges (ppm)	50, 100, 250, 500, 1000, 2500, 5000, 10,000, 25,000, 50,000
Output	0-1 volt

TABLE 1 (Cont.)**CO₂ INFRARED GAS ANALYZER – HORIBA - MODEL PIR 2000**

Response Time (0-90%)	5 seconds
Zero Drift	± 1% of full scale in 24 hours
Span Drift	± 1% of full scale in 24 hours
Linearity	± 2% of full scale
Resolution	Less than 1% of full scale
Operating Ranges (%)	0-5, 0-15, 0-25
Output	0-1 volt

SO₂ PULSED FLOURESCENT - TECO - MODEL 43C-HL

Response Time	80 seconds
Zero Drift	± 1%
Span Drift	± 1%
Linearity	± 1%
Resolution	± 1%
Operating Ranges	5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000
Output	0-10 volt

RATFISCH FID TOTAL HYDROCARBON ANALYZER -- MODEL 55CA

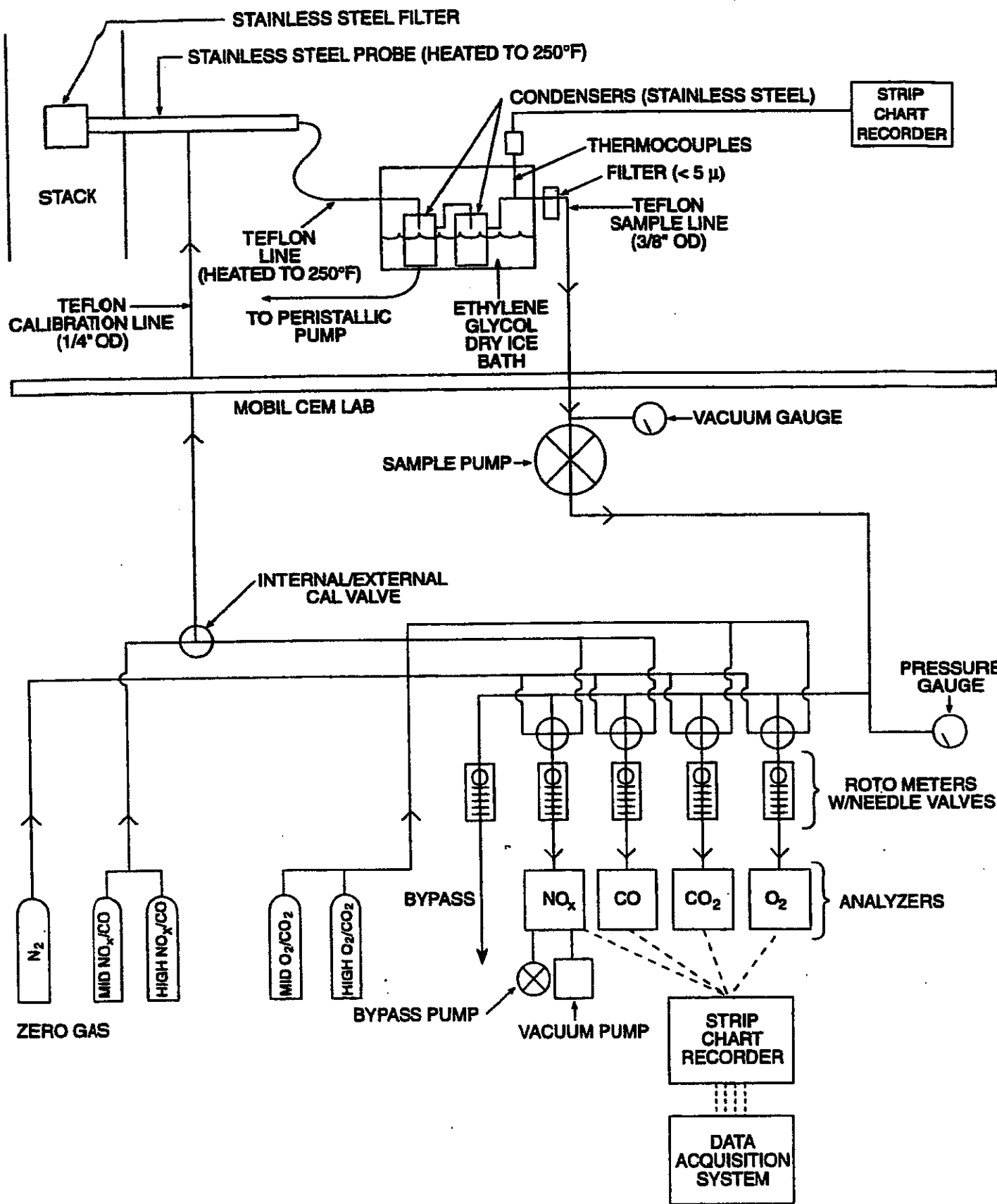
Response Time (0-90%)	5 seconds
Zero Drift	± 1% full scale in 24 hours
Span Drift	± 1% full scale in 24 hours
Linearity	± 1% full scale - constant
Accuracy	± 1% full scale at constant temp.
Operating Ranges (ppm)	10, 100, 1000, 10,000
Output	0 - 10 volts

LINSEIS MODEL L2045 FOUR PEN STRIP CHART RECORDER

Pen Speed	up to 120 cm/min
Measuring Response	0-20 volts
Linearity Error	0.25%
Accuracy	0.3%
Zero Suppression	Manual (from 1 to 10X full scale)

LINEAR 3 PEN CONTINUOUS -- MODEL 595 STRIP CHART

Pen Response	20 inches/second
Measuring Response	1 Mv through 5V
Zero Set	Electronically adjustable full scale with 1 full scale of zero suppression
Accuracy	Total limit of error ± 0.5%



CEM System Schematic

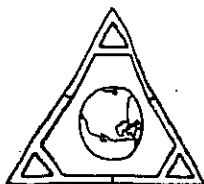
Method:	NO/NO _x by Continuous Analyzer
Applicable Reference Methods:	EPA 7E, EPA 20; CARB 100, BAAQMD ST-13A, SCAQMD 100.1
Principle:	A sample is continuously withdrawn from the flue gas stream, conditioned and conveyed to the instrument for direct readout of NO or NO _x .
Analyzer:	TECO Model 10AR
Measurement Principle:	Chemiluminescence
Accuracy:	1% of full scale
Ranges:	0-2.5, 0-10, 0-25, 0-100, 0-250, 0-1000, 0-2500, 0-10,000 ppm
Output:	0-10 V
Inferences:	Compounds containing nitrogen (other than ammonia) may cause interference.
Response Time:	90%, 1.5 seconds (NO mode) and 1.7 seconds (NO _x mode)
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously. If EPA Method 20 is used, that method's specific procedures for selecting sample points are used.
Analytical Procedure:	<p>The oxides of nitrogen monitoring instrument is a chemiluminescent nitric oxide analyzer. the operational basis of the instrument is the chemiluminescent reaction of NO and ozone (O₃) to form NO₂ in an excited state. Light emission results chemiluminescence is monitored through an optical filter by a high sensitivity photomultiplier tube, the output of which is electronically processed so it is linearly proportional to the NO concentration. The output of the instrument is in ppmV.</p> <p>When NO₂ is expected to be present in the flue gas, a supercooled water dropout flask will be placed in the sample line to avoid loss of NO₂. Since NO₂ is highly soluble in water, "freezing out" the water will allow the NO₂ to reach the analyzers for analysis. The analyzer measures NO only. In the NO_x mode, the gas is passed through a moly converter which converts NO₂ to NO and a total NO_x measurement is obtained. NO₂ is determined as the difference between NO and NO_x. Use of a moly converter instead of a stainless steel converter eliminates NH₃ interference; NH₃ is converted to NO with a stainless converter, but not with a moly converter.</p>

Method:	Oxygen (O₂) by Continuous Analyzer
Applicable Reference Methods:	EPA 3A, EPA 20, CARB 100, BAAQMD ST-14, SCAQMD 100.1
Principle:	A sample is continuously withdrawn from the flue gas stream, conditioned and conveyed to the instrument for direct readout of O ₂ concentration.
Analyzer:	Teledyne Model 326R
Measurement Principle:	Electrochemical cell
Ranges:	0-5, 0-25% 0-100%
Accuracy:	1% of full scale
Output:	0-1 V
Interferences:	Halogens and halogenated compounds will cause a positive interference. Acid gases will consume the fuel cell and cause a slow calibration drift.
Response Time:	90% < 60 seconds
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously. If Method 20 is used, that method's specific procedures for selecting sample points are used. Otherwise, stratification checks are performed at the start of a test program to select single or multiple-point sample locations.
Analytical Procedure:	An electrochemical cell is used to measure O ₂ concentration. Oxygen in the flue gas diffuses through a Teflon membrane and is reduced on the surface of the cathode. A corresponding oxidation occurs at the anode internally and an electric current is produced that is proportional to the concentration of oxygen. This current is measured and conditioned by the instrument's electronic circuitry to give an output in percent O ₂ by volume.

Method:	Carbon Dioxide (CO₂) by Continuous Analyzer
Applicable Reference	EPA 3A, CARB 100, BAAQMD ST-5, SCAQMD 100.1
Principle:	A sample is continuously drawn from the flue gas stream, conditioned and conveyed to the instrument for direct readout of CO ₂ concentration.
Analyzer:	PIR 2000
Measurement Principle:	Non-dispersive infrared (NDIR)
Accuracy:	1% of full scale
Ranges:	0-5, 0-15%
Output:	0-1 V
Interferences:	A possible interference includes water. Since the instrument receives dried sample gas, this interference is not significant.
Response Time:	5 seconds
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously.
Analytical Procedure:	Carbon dioxide concentrations are measured by short path length non-dispersive infrared analyzers. These instruments measure the differential in infrared energy absorbed from energy beams passed through a reference cell (containing a gas selected to have minimal absorption of infrared energy in the wavelength absorbed by the gas component of interest) and a sample cell through which the sample gas flows continuously. The differential absorption appears as a reading on a scale of 0-100%.

Method:	Carbon Monoxide (CO) by NDIR/Gas Filter Correlation
Applicable Reference Methods:	EPA 6C; CARB 1-100; BAAQMD ST-6, SCAQMD 100.1
Principle:	A sample is continuously drawn from the flue gas stream, conditioned and conveyed to the instrument for direct readout of CO concentration.
Analyzer:	TECO, Model 48H
Measurement Principle:	NDIR/Gas Filter Correlation
Precision:	0.1 % ppm
Ranges: ppm	0-50, 0-100, 0-250, 0-500, 0-1000, 0-2500, 0-5000, 0-10000, 0-2500, 0-3,000
Output:	0-1 V
Interferences:	Negligible interference from water and CO ₂
Rise/Fall times (0-95%)	1 minute @ 1 lpm flow, 30 second integration time
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously. Sample point selection has been described previously.
Analytical Procedure:	Radiation from an infrared source is chopped and then passed through a gas filter which alternates between CO and N ₂ due to rotation of a filter wheel. The radiation then passes through a narrow band-pass filter and a multiple optical pass sample cell where absorption by the sample gas occurs. The IR radiation exits the sample cell and falls on a solid state IR detector.

Method:	Sulfur Dioxide (SO₂) by Pulsed Fluorescent
Applicable Reference Methods:	EPA 10; CARB 1-100; BAAQMD ST-6, SCAQMD 100.1
Principle:	A sample is continuously drawn from the flue gas stream, conditioned and conveyed to the instrument for direct readout of SO ₂ concentration.
Analyzer:	TECO, Model 43C-HL
Measurement Principle:	Pulsed fluorescence SO ₂ analyzer
Precision:	0.1 % ppm
Ranges:	5, 10, 20, 50, 100, 200 ppm
Output:	0-10 V
Interferences:	Less than lower detectable limit except for the following: NO <3 ppb, m-xylene <2 ppm, H ₂ O <2 % of reading.
Response Time:	80 seconds
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously. Sample point selection has been described previously.
Analytical Procedure:	The sample flows into the fluorescent chamber, where pulsating UV light excites the SO ₂ molecules. The condensing lens focuses the pulsating UV light into the mirror assembly. The mirror assembly contains four selecting mirrors that reflect only the wavelengths which excite SO ₂ molecules. As excited SO ₂ molecules decay to lower energy states they emit UV light that is proportional to the SO ₂ concentration. The PMT (photomultiplier tube) detects UV light emission from decaying SO ₂ molecules. The PMT continuously monitors pulsating UV light source and is connected to a circuit that compensates for fluctuating in the light.



AtmAA Inc.

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environmental consultants
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**Tandem Gas Chromatographic/Mass Spectroscopic-Electrolytic
Conductivity Detector (GC/MS-ELCD) Method for
Determination of Total Sulfur in Gas Samples**

AtmAA, Inc.
03-060

3/30/93

This method measures selected reduced sulfur species, including but not limited to hydrogen sulfide, carbonyl sulfide, methyl mercaptan, ethyl mercaptan, dimethyl sulfide, carbon disulfide, isopropyl mercaptan, n-propyl mercaptan, and dimethyl disulfide in gaseous sample matrices using gas chromatographic separation and a mass spectrometric and electrolytic conductivity detector (ELCD), where the ELCD measures hydrogen sulfide only. A non-polar methyl silicon capillary gas chromatographic column is used for component separation and selected ion monitoring is used for component quantification. Component quantification is obtained using a multi-component external standard prepared by Scott Specialty Gases. The lower detection limit varies by component but is at least 0.1 ppmv ethyl mercaptan (component of lowest sensitivity) for a 0.31 ml sample volume injection. The upper quantitation limit has not been determined but is at least beyond 80 ppmv dimethyl disulfide, for which response remained linear from 0.1 ppmv to 80 ppmv.

Hydrogen sulfide is measured using an electrolytic conductivity detector operated in the oxidative sulfur mode. A Chromosil 310 column, operated isothermally at 45°C. is used to separate H₂S from other sulfur components. A fixed volume loop injection is used in the analysis for H₂S.

Lower Detection Limits (LDL's):

Using a 1 ml injection volume for H₂S by electrolytic conductivity detector and 0.40 ml injection volume for GC/MS measured sulfur compounds, the following LDL's are obtained:

	(ppmv)
Hydrogen sulfide	0.5
Carbonyl sulfide	0.03
Methyl mercaptan	0.03
Ethyl mercaptan	0.04
Dimethyl sulfide	0.02
Carbon disulfide	0.02
i-propyl mercaptan	0.03
n-propyl mercaptan	0.03
Dimethyl disulfide	0.02

Equipment:

A Hewlett-Packard 5890 series II gas chromatograph (GC), Hewlett-Packard 5971A Mass Selective Detector, 486 MS/DOS computer and HP operating software are used for all sulfur species except H_2S . The GC is fitted with a heated 6-port Valco 1/16" line, sample injection valve. All gas transfer lines to the sample loop are fused silica lined Restek tubing. The fixed volume (0.40 ml) sample loop is Teflon. The transfer line from the valve to the GC column is cleaned and treated blank 0.53 mm OD fused silica line with polyimide coating.

H_2S is measured using a Varian 1400 GC with the Hall oxidative quartz tube furnace and electrolytic cell attached. Nitrogen is used as carrier and oxygen is used as the combustion gas.

Multi-component gaseous standards are prepared by Scott Specialty Gas and are contained in two separate aluminum cylinders and a Scotty IV canister as follows:

Cylinder A (CAL12250)

Carbonyl sulfide	15.2 ppmv
Ethyl mercaptan	13.4 ppmv
Carbon disulfide	16.1 ppmv

Cylinder B (CAL3563)

Hydrogen sulfide	12.3 ppmv
Methyl mercaptan	22.6 ppmv
Dimethyl sulfide	20.3 ppmv
Dimethyl disulfide	

Scotty IV (mix 252)

Hydrogen Sulfide 93.8 ppmv

Gas tight clean glass volumetric syringes of 10, 20, & 50 ml capacity, with smooth glass barrel (not sintered glass) are used to make volumetric dilutions of sample or standard.

GC/MS SIM parameters:

	Dwell per ion	start time	Ions
Group 1:	75 msec.	8.0 min.	60
Group 2:	75 msec.	10.0 min.	47,48,64
Group 3:	75 msec.	14.5 min.	47,62,76,78,43,61
Group 4:	75 msec.	19.5 min.	79,94,122,142,156,128

Components monitored:

Group 1:	carbonyl sulfide
Group 2:	methyl mercaptan
Group 3:	ethyl mercaptan, dimethyl disulfide, carbon disulfide, isopropyl mercaptan, n-propyl mercaptan
Group 4:	dimethyl sulfide



Component	Quantitation ion	Confirmation ion
carbonyl sulfide	60	none
methyl mercaptan	47	48
ethyl mercaptan	62	47
dimethyl sulfide	62	47
carbon disulfide	76	78
iso-propyl mercaptan	76	43,47,61
n-propyl mercaptan	76	43,47,61
dimethyl disulfide	94	79

Sulfur dioxide is analyzed by monitoring mass 64 which is included in Group 2 ions.

Calibration:

Gaseous standards can be analyzed prior to or after a set of samples. Response factors are determined from a single point standard calibration. Multi-point calibrations are performed to verify linearity. Consistency of standard response with continuing calibrations is observed to indicate performance of multi-point calibration.

Samples containing components at less than the stated LDL can be analyzed by cryogenically focusing a measured volume of gaseous sample onto a glass bead filled Teflon loop immersed in liquid argon. The sample is thermally transferred upon injection by immersing the sample loop in near boiling temperature water. The LDL obtained by this technique is calculated as:

$$LDL_{cryo} = (cryo \text{ volume}/0.40) * LDL_{std}$$

Acceptable volumes for cryogenic concentration range from 3 to 100 ml. and are determined based on amounts of other components in the sample such as water, carbon dioxide or hydrocarbons.

Procedure:

A volumetric sample of landfill or source collected gas is transferred from a Tedlar[®] bag to the 6-port valve injection line using a glass syringe of approximately 10 ml. A Teflon loop of 0.40 ml volume is used to inject the sample. When sample concentrations exceed that of the standard, appropriate volumetric sample dilutions are made using the glass syringes with dry nitrogen diluent. Immediately after sample injection, the GC/MS is started. Standards are analyzed in the same manner as samples. Appropriate component peaks are monitored and integrated after sample analysis data set has been obtained.

Hydrogen sulfide is measured using the electrolytic conductivity detector by a separate direct fixed loop valve injection using heated Teflon loop, transfer lines, and Teflon Chromosil 310 GC column.

A response factor for a standard component is calculated as:

$$rf = \text{std. amt.} / \text{std. area}$$

Sample concentration is calculated using the response factor:

$$\text{conc.} = rf \times \text{sample area}$$

At least 10% of samples in a sample set, or minimum of one sample per set are analyzed twice to determine precision. A separate report showing repeat analyses results is included with an analytical report of sulfur component concentrations per each sample set. Repeat analyses must agree within +/- 10% except for component concentrations less than 1 ppmv. A nitrogen blank is analyzed between standards and samples to verify that there is no component carry-over. Samples are analyzed as soon after they are received as possible, preferably same day and within four hours of collection. Data is being gathered to determine stability of sulfur compounds in Tedlar[®] bag containers in an effort to extend sample holding time. Samples are usually analyzed before standards to prevent carry-over, since most sulfur components measured in landfill gas samples are lower in concentration than those in the standards.

GC/MS Analysis Conditions:

GC conditions: a 30 M x 0.2 mm, 0.50 um film methyl silicon PONA column from Hewlett-Packard is temperature programmed as follows:

-65 degrees C, hold min.

15 degrees C min. to 220 degrees C, hold 5 min.

Valve oven Temp. 150 degrees C

GC/MS transfer line 180 degrees C

Carrier gas is helium, pressure regulated at 21 psi.

MS Conditions:

MS calibration is performed periodically prior to performing analyses using PFTBA (perfluoro-tributylamine) as supplied by Hewlett-Packard and as controlled by HP software under the mid-range auto tune program.

Solvent delay = 8 min.

Hall Detector/GC Analysis Conditions:

6' x 1/8" Teflon, Chromosil 310 analytical column

45 degrees C, isothermal

Valve oven & transfer line Temp. 105 degrees C.

Carrier gas is nitrogen, flow rate 18 cc/min.

Oxygen oxidation gas, flow rate 18 cc/min.

Quartz tube oxidation oven Temp. 650 degrees C.



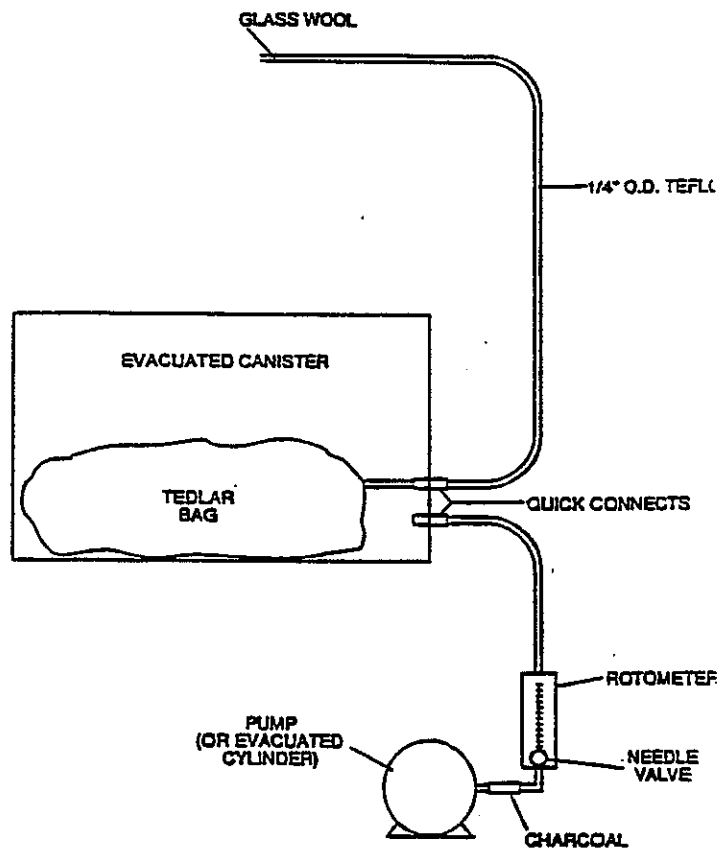
Method: Hydrocarbons by SCAQMD Micro Total Carbon Analyses

Reference: Tedlar Bag Lung Sampler

Principle: Duplicate Tedlar bags are filled with flue gas at a constant rate. The bag contents are analyzed by total combustion analyses/flame ionization detection for methane and total gaseous non-methane hydrocarbons.

Sampling Procedure: Duplicate samples are collected by evacuating the canister (see figure) at a constant rate over each test run using a rotameter/needle valve and a diaphragm pump. Prior to each sampling run, the evacuated canister (containing the Tedlar bag) is leak checked at 2" Hg vacuum. The sample train upstream of the Tedlar bag is then purged with stack gas. At the conclusion of each test run, each Tedlar bag sample is sealed and stored in an opaque container pending analysis.

Analytical Procedure: Methane and TNMHC concentration from both samples are determined using the SCAQMD Total Combustion Analysis (TCA) procedure.



APPENDIX B - Computer Printout of Results

Facility: Bradley Landfill
Source: Flare #2
Job No.: W07-035
Date: 04/22/03

TOTAL COMBUSTION ANALYSIS RESULTS

Sample ID Run Number	Inlet 1A	Inlet 1B	Average
Methane in Tank	288000	298000	293000
TNMHC,Tank (Noncond.)	308	321	
TNMHC - Condensables	2026.2	2030.5	
TNMHC - Total	2334.2	2351.5	
CO Concentration (ppm)	20	20	20
CO2 Concentration (ppm)	258000	268000	263000
O2 Concentration (%)	3.34	2.74	3.04

Sample Parameters

	H	B	
Tank Number	H	B	
Trap Number	K	Y	
Sample Tank Volume (l)	12.272	12.242	
Initial Pressure (Torr)	1.3	1.3	
Initial Temperature (deg. K)	292	292	
Final Pressure (mm Hg)	378	365	
Final Temperature (deg. K)	292	292	
Sample Volume (l)	6.11	5.88	
Analysis Pressure (mm Hg)	803	802	
Analysis Temperature (deg. K)	292	292	
ICV Volume (l)	2.266	2.266	
ICV Final Pressure (mm Hg)	800	800	
ICV Final Temperature (deg.	292	292	
CO2 in ICV (ppm)	5460	5270	
TNMHC,Trap (Condensables)	2026	2031	
Stack Total TNMHC	2334	2352	2343

NOTE: All hydrocarbon values are in terms of ppm, v/v, as methane.

SCAQMD Methods 1-4 Flowrate Determination

Facility: Bradley Landfill
 Source: Flare #2
 Job No.: W07-035
 Date: 04/22/03

STANDARD TEMPERATURE	Degrees F	60		
RUN NUMBER	*****	1	2	Average
CLOCK TIME: INITIAL	*****	920	1115	
CLOCK TIME: FINAL	*****	1020	1215	
AVG. STACK TEMPERATURE	Degrees F	112	114	113
AVG. SQUARE DELTA P	Inches H2O	0.8958	0.8957	0.8958
BAROMETRIC PRESSURE	Inches HG	29.15	29.15	29.15
SAMPLING TIME	Minutes	60	60	60
SAMPLE VOLUME	Cubic Feet	48.545	48.925	48.735
AVG. METER TEMP.	Degrees F	78.5	82.7	80.6
AVG. DELTA H	Inches H2O	1.70	1.70	1.70
DGM CALIB. FACTOR [Y]	*****	0.9873	0.9873	0.9873
WATER COLLECTED	Milliliters	47	56	52
CO 2	Percent	26.3	26.3	26.3
O 2	Percent	3.0	3.0	3.0
CO	Percent	0.0	0.0	0.0
CH4	Percent	29.3	29.3	29.3
N 2	Percent	41.4	41.4	41.4
STACK AREA	Square Inches	78.5	78.5	78.5
STATIC PRESSURE	Inches WG	7.00	7.00	7.00
PITOT COEFFICIENT	*****	0.99	0.99	0.99
SAMPLE VOLUME DRY	DSCF	45.28	45.29	45.28
WATER AT STD.	SCF	2.2	2.6	2.4
MOISTURE	Percent	4.7	5.5	5.1
MOLE FRACTION DRY GAS	*****	0.95	0.94	0.95
MOLECULAR WT. DRY	lb/lb Mole	28.81	28.81	28.81
EXCESS AIR	Percent	39	39	39
MOLECULAR WT. WET	lb/lb Mole	28.31	28.22	28.26
STACK GAS PRESSURE	Inches HG	29.66	29.66	29.66
STACK VELOCITY	AFPM	3755	3767	3761
VOLUMETRIC FLOWRATE, DRY STD	DSCFM	1759	1743	1751
VOLUMETRIC FLOWRATE, ACTUAL	ACFM	2047	2054	2050

EMISSION RATES

SAMPLE A				
TNMHC Concentration, as CH4	ppm	2334		2334
TNMHC Concentration, as CH4	mg/dscf	45		45
TNMHC Emission Rate, as CH4	lb/hr	10.4		10.3
SAMPLE B				
TNMHC Concentration, as CH4	ppm	2352		2352
TNMHC Concentration, as CH4	mg/dscf	45		45
TNMHC Emission Rate, as CH4	lb/hr	10.5		10.4
AVERAGE				
TNMHC Concentration, as CH4	ppm	2343		2343
TNMHC Concentration, as CH4	mg/dscf	45		45
TNMHC Emission Rate, as CH4	lb/hr	10.4		10.4

SCAQMD Method 307.91

Facility: Bradley Landfill
 Source: Flare #2
 Job No.: W07-035
 Date: 04/22/03

Sulfur Compounds

Speciated Compound		Concentration ppm, as H2S	No. of S molecules in Compound	Total S ppm, as H2S	SO2 Conc. mg/dscf	Avg. Inlet Flow Rate dscfm	SO2 Rate lb/hr
Hydrogen Sulfide		42.2	1	42.20	3.23	1751	0.748
Carbonyl Sulfide	<	0.05	1	0.05	0.00	1751	0.001
Methyl mercaptan		0.14	1	0.14	0.01	1751	0.002
Ethyl mercaptan		0.097	1	0.10	0.01	1751	0.002
Dimethyl sulfide		0.17	1	0.17	0.01	1751	0.003
Carbon disulfide	<	0.05	2	0.10	0.01	1751	0.002
Dimethyl disulfide	<	0.05	2	0.10	0.01	1751	0.002
iso-propyl mercaptan	<	0.06	1	0.06	0.00	1751	0.001
n-propyl mercaptan	<	0.06	1	0.06	0.00	1751	0.001
Total				42.98			0.762

EXPANSION AND F-FACTOR CALC. METHOD

Client: Bradley Landfill
 Location: Sun Valley, CA
 Unit: Flare #2

Date: 04/22/03
 Job #: W07-035
 Run#: 1

Fuel temperature _____ deg. F Std. Temp. 60 deg. F
 Fuel Pressure _____ psi
 Fuel Flow Rate _____ cfm Fuel Flow 1759 dscfm
 Exhaust Outlet O2 10.66 %
 Barometric Pressure 29.15

COMPONENTS	MOLE %	HHV btu/ft3	LLV btu/ft3	Exp Factor dscf/scf fuel
Oxygen	<u>3.04</u>			0.030
Nitrogen	<u>41.36</u>			0.414
Carbon Dioxide	<u>26.30</u>			0.263
Methane	<u>29.30</u>	295.93	266.45	2.511
Ethane C2		0.00	0.00	0.000
Propane C3		0.00	0.00	0.000
Iso-Butane C4		0.00	0.00	0.000
N-Butane		0.00	0.00	0.000
Iso-Pentane C5		0.00	0.00	0.000
N-Pentane		0.00	0.00	0.000
Hexane C6		0.00	0.00	0.000
Heptane C7		0.00	0.00	0.000
Octane C8		0.00	0.00	0.000
Nonane C9		0.00	0.00	0.000
Total	100.00	295.93	266.45	3.22

CALCULATIONS

EXHAUST FLOW RATE, Q = (scfm*Exp Fac)*(20.92/(20.92-%O2))

11543 DSCFM

EPA F-Factor = (scf exhaust/scf fuel)/(btu/scf fuel)*(1000000 btu/MMbtu)

10874 dscf/MMbtu

EXPANSION AND F-FACTOR CALC. METHOD

Client: Bradley Landfill
 Location: Sun Valley, CA
 Unit: Flare #2

Date: 04/22/03
 Job #: W07-035
 Run#: 2

Fuel temperature _____ deg. F
 Fuel Pressure _____ psi
 Fuel Flow Rate _____ cfm
 Exhaust Outlet O2 11.64 %
 Barometric Pressure 29.15

Std. Temp. 60 deg. F
 Fuel Flow 1743 dscfm

COMPONENTS	MOLE %	HHV btu/ft3	LLV btu/ft3	Exp Factor dscf/scf fuel
Oxygen	<u>3.04</u>			0.030
Nitrogen	<u>41.36</u>			0.414
Carbon Dioxide	<u>26.30</u>			0.263
Methane	<u>29.30</u>	295.93	266.45	2.511
Ethane C2		0.00	0.00	0.000
Propane C3		0.00	0.00	0.000
Iso-Butane C4		0.00	0.00	0.000
N-Butane		0.00	0.00	0.000
Iso-Pentane C5		0.00	0.00	0.000
N-Pentane		0.00	0.00	0.000
Hexane C6		0.00	0.00	0.000
Heptane C7		0.00	0.00	0.000
Octane C8		0.00	0.00	0.000
Nonane C9		0.00	0.00	0.000
Total	100.00	295.93	266.45	3.22

CALCULATIONS

$$\text{EXHAUST FLOW RATE, Q} = (\text{scfm} \times \text{Exp Fac}) \times (20.92(20.92 - \%O_2))$$

12638 DSCFM

$$\text{EPA F-Factor} = (\text{scf exhaust} / \text{scf fuel}) / (\text{btu} / \text{scf fuel}) \times (1000000 \text{ btu/MMbtu})$$

10874 dscf/MMbtu

SCAQMD Method 5.1 Particulate Emissions

Facility: Bradley Landfill
Source: Flare #2
Job No.: W07-035
Date: 04/22/03

STANDARD TEMPERATURE	Degrees F	60			
RUN NUMBER	*****	1	2	1	2
DATE OF RUN	*****	04/22/03	04/22/03	04/22/03	04/22/03
CLOCK TIME: INITIAL	*****	918	1120	918	1120
CLOCK TIME: FINAL	*****	1043	1233	1043	1233
AVG. STACK TEMPERATURE	Degrees F	1658	1645		
AVG. SQUARE DELTA P	Inches H2O	0.1225	0.1225		
NOZZLE DIAMETER	Inches	0.976	0.976		
BAROMETRIC PRESSURE	Inches HG	29.15	29.15		
SAMPLING TIME	Minutes	60	60		
SAMPLE VOLUME	Cubic Feet	59.955	59.850		
AVG. METER TEMP.	Degrees F	68.9	70.4		
AVG. DELTA H	Inches H2O	3.20	3.20		
DGM CALIB. FACTOR [Y]	*****	0.9876	0.9876		
WATER COLLECTED	Milliliters	138	135		
CO 2	Percent	8.93	8.09		
O 2	Percent	10.66	11.64		
CO	Percent				
CH4	Percent				
N 2	Percent	80.41	80.28		
STACK AREA	Square Inches	7238.2	7238.2		
STATIC PRESSURE	Inches WG.	-0.080	-0.080		
PITOT COEFFICIENT	*****	0.84	0.84		
SAMPLE VOLUME DRY	DSCF	57.17	56.91		
WATER AT STD.	SCF	6.5	6.4		
MOISTURE	Percent	10.2	10.1		
MOLE FRACTION DRY GAS	*****	0.90	0.90		
MOLECULAR WT.DRY	lb/lb Mole	29.86	29.76		
EXCESS AIR	Percent	101	122		
MOLECULAR WT. WET	lb/lb Mole	28.64	28.58		
STACK GAS PRESSURE	Inches HG	29.14	29.14		
STACK VELOCITY	AFPM	841	839		
VOLUMETRIC FLOWRATE, DRY STI	DSCFM	9075	9130	11543	*
VOLUMETRIC FLOWRATE, ACTUAL	ACFM	42262	42183		
ISOKINETIC RATIO	Percent	100	99		

CALCULATIONS FOR GRAIN LOADING AND EMISSION RATES

TOTAL PARTICULATE	mg	5.0	4.6	5.0	4.6
PARTICULATE CONCENTRATION	gr/dscf	0.0013	0.0012	0.0013	0.0012
PARTICULATE EMISSION RATE	lb/hr	0.10	0.10	0.13	0.13

*Denotes the use of calculated flowrate based on expansion factor of LFG.

SCAQMD Method 100.1 Emission Rates

Facility: Bradley Landfill
Source: Flare #2
Job No.: W07-035
Date: 04/22/03

Run Number	*****	1	2
Load	*****	as Found	as Found
EPA F-Factor	dscf/MMBtu	10874	10874
Stack Flow Rate	dscfm	11543	12638
Oxygen	%	10.66	11.64
Carbon Dioxide	%	8.93	8.09

Oxides of Nitrogen

Concentration	ppm	13.1	11.3
Concentration @ 3 % O2	ppm	22.9	21.9
Concentration	lb/dscf	1.59E-06	1.37E-06
Emission Rate	lb/MMBtu	3.53E-02	3.37E-02
Emission Rate	lb/hr	1.100	1.043

Carbon Monoxide

Concentration	ppm	<	20.0	<	20.0
Concentration @ 3 % O2	ppm	<	35.0	<	38.6
Concentration	lb/dscf	<	1.48E-06	<	1.48E-06
Emission Rate	lb/MMBtu	<	3.28E-02	<	3.62E-02
Emission Rate	lb/hr	<	1.022	<	1.119

SCAQMD Method 100.1 Bias Adjustment

Facility: Bradley Landfill
Source: Flare #2
Job No.: W07-035
Date: 04/22/03

Run No. 1

Parameter	Measured Conc. (ppm,%)	Reference Span gas (ppm.%)	Initial Bias Zero (ppm.%)	Final Bias Zero (ppm.%)	Average Bias Zero (ppm.%)	Initial Bias Span (ppm.%)	Final Bias Span (ppm.%)	Average Bias Span (ppm.%)	Bias Adjusted Conc. (ppm.%)
NOx	12.75	10.40	0.05	0.13	0.09	10.20	10.08	10.14	13.10
O2	10.67	12.01	0.05	0.05	0.05	12.03	12.00	12.01	10.66
CO	1.55	50.40	0.00	0.00	0.00	49.80	49.00	49.40	1.58
CO2	8.90	7.00	0.00	0.04	0.02	6.94	7.02	6.98	8.93

Run No. 2

Parameter	Measured Conc. (ppm,%)	Reference Span gas (ppm.%)	Initial Bias Zero (ppm.%)	Final Bias Zero (ppm.%)	Average Bias Zero (ppm.%)	Initial Bias Span (ppm.%)	Final Bias Span (ppm.%)	Average Bias Span (ppm.%)	Bias Adjusted Conc. (ppm.%)
NOx	10.95	10.40	0.13	0.15	0.14	10.08	10.03	10.05	11.34
O2	11.58	12.01	0.05	0.05	0.05	12.00	11.90	11.95	11.64
CO	1.40	50.40	0.00	0.00	0.00	49.00	49.00	49.00	1.44
CO2	8.07	7.00	0.04	0.04	0.04	7.02	6.96	6.99	8.09

Client: Waste Management
 Job No.: W07-035
 Site: Bradley Landfill
 Unit: Flare #2

Date: 04/22/03
 Run #: 1
 Fuel: L.F.G.
 Std. O2: 3

	O2 %	CO2 %	NOx ppm	CO ppm
Range:	25.00	20.00	25.00	100.00
Span:	12.01	7.00	10.40	50.40
Low:				
High:	20.90	12.01	21.00	79.20

**** POST-TEST DRIFT ****

Values				
Zero:	0.00	0.00	0.00	0.00
Span:	12.00	7.04	10.40	50.00

Percent Drift

Zero:	0.00	0.00	0.00	0.00
Span:	-0.04	0.20	0.00	-0.40

**** RAW AVERAGE CONCENTRATION ****

Average:		10.67	8.90	12.75	1.55
O2 adjust:				22.32	2.71
Date	Time	O2	CO2	NOx	CO
21-Apr-03	918	10.47	9.12	12.58	0.92
21-Apr-03	919	10.15	9.41	13.35	1.09
21-Apr-03	920	10.30	9.24	13.90	1.29
21-Apr-03	921	10.33	9.22	13.41	1.38
21-Apr-03	922	10.44	9.10	13.41	1.46
21-Apr-03	923	10.71	8.85	13.03	1.46
21-Apr-03	924	10.31	9.24	13.38	1.71
21-Apr-03	925	10.41	9.14	13.51	2.14
21-Apr-03	926	10.33	9.24	13.63	2.47
21-Apr-03	927	10.34	9.23	13.68	2.74
21-Apr-03	928	10.29	9.29	13.60	2.96
21-Apr-03	929	10.53	9.06	13.46	3.10
21-Apr-03	930	10.43	9.17	13.12	3.08
21-Apr-03	931	10.43	9.16	13.15	3.02
21-Apr-03	932	10.54	9.05	13.61	2.90
21-Apr-03	933	11.05	8.55	12.82	2.57
21-Apr-03	934	11.18	8.43	12.88	2.20
21-Apr-03	935	11.29	8.35	12.84	1.91
21-Apr-03	936	11.26	8.38	12.84	1.66
21-Apr-03	937	11.25	8.40	13.15	1.40
21-Apr-03	938	11.19	8.46	13.21	1.18
21-Apr-03	939	11.30	8.38	13.24	1.03
21-Apr-03	940	11.37	8.32	13.14	0.81

21-Apr-03	941	11.50	8.23	13.19	0.58
21-Apr-03	942	11.67	8.09	13.31	0.42
21-Apr-03	943	11.61	8.14	13.23	0.27
21-Apr-03	944	11.81	7.97	12.97	0.13
21-Apr-03	945	11.84	7.95	12.82	0.05
21-Apr-03	946	11.83	7.95	12.82	0.00
21-Apr-03	947	11.79	7.98	12.80	0.00
21-Apr-03	948	11.74	8.01	12.77	0.00
21-Apr-03	1013	10.74	8.74	13.67	-0.02
21-Apr-03	1014	10.67	8.81	13.76	0.47
21-Apr-03	1015	10.77	8.73	12.21	0.85
21-Apr-03	1016	11.36	8.21	9.41	1.11
21-Apr-03	1017	11.67	7.97	8.64	1.09
21-Apr-03	1018	11.51	8.10	8.51	1.09
21-Apr-03	1019	11.51	8.10	8.59	1.23
21-Apr-03	1020	11.34	8.23	8.75	1.45
21-Apr-03	1021	11.34	8.23	9.00	1.67
21-Apr-03	1022	11.26	8.30	8.90	1.94
21-Apr-03	1023	11.43	8.16	8.70	2.03
21-Apr-03	1024	11.18	8.35	8.61	2.03
21-Apr-03	1025	11.08	8.45	8.66	2.15
21-Apr-03	1026	10.85	8.64	9.34	2.28
21-Apr-03	1027	10.09	9.41	13.34	2.54
21-Apr-03	1028	9.85	9.61	15.17	2.83
21-Apr-03	1029	9.85	9.63	14.90	2.92
21-Apr-03	1030	10.00	9.50	14.78	2.98
21-Apr-03	1031	9.74	9.73	15.10	3.07
21-Apr-03	1032	9.38	10.06	12.39	3.33
21-Apr-03	1033	9.66	9.81	11.53	3.44
21-Apr-03	1034	9.70	9.79	10.90	2.77
21-Apr-03	1035	9.69	9.80	10.71	2.41
21-Apr-03	1036	9.32	10.12	13.41	1.84
21-Apr-03	1037	9.77	9.72	15.87	1.19
21-Apr-03	1038	9.63	9.85	15.98	0.73
21-Apr-03	1039	9.58	9.88	16.22	0.48
21-Apr-03	1040	9.59	9.90	16.35	0.28
21-Apr-03	1041	10.36	9.13	16.49	0.19
21-Apr-03	1042	10.23	9.29	14.97	0.01
21-Apr-03	1043	8.95	10.44	16.73	-0.19

Client: Waste Management
 Job No.: W07-035
 Site: Bradley Landfill
 Unit: Flare #2

Date: 04/22/03
 Run #: 2
 Fuel: L.F.G.
 Std. O2: 3

	O2 %	CO2 %	NOx ppm	CO ppm
Range:	25.00	20.00	25.00	100.00
Span:	12.01	7.00	10.40	50.40
Low:				
High:	20.90	12.01	21.00	79.20

**** POST-TEST DRIFT ****

Values				
Zero:	0.00	0.00	0.00	0.00
Span:	12.00	7.00	10.25	50.00

Percent Drift				
Zero:	0.00	0.00	0.00	0.00
Span:	-0.04	0.00	-0.60	-0.40

**** RAW AVERAGE CONCENTRATION ****

Average:		11.58	8.07	10.95	1.40
O2 adjust:				21.02	2.68
Date	Time	O2	CO2	NOx	CO
		3.0			
21-Apr-03	1120	11.58	8.07	12.88	1.25
21-Apr-03	1121	10.99	8.55	13.25	1.47
21-Apr-03	1122	11.34	8.26	13.23	1.65
21-Apr-03	1123	11.30	8.32	12.87	1.53
21-Apr-03	1124	11.42	8.21	12.92	1.51
21-Apr-03	1125	11.43	8.22	12.25	1.40
21-Apr-03	1126	11.54	8.12	9.59	1.18
21-Apr-03	1127	11.87	7.87	8.55	1.15
21-Apr-03	1128	11.75	7.97	8.67	1.23
21-Apr-03	1129	11.73	7.99	8.55	1.27
21-Apr-03	1130	11.76	7.95	11.41	1.38
21-Apr-03	1131	10.85	8.76	12.72	1.41
21-Apr-03	1132	11.16	8.44	14.27	1.69
21-Apr-03	1133	11.62	8.07	12.54	1.63
21-Apr-03	1134	11.56	8.12	12.72	1.47
21-Apr-03	1135	11.51	8.16	12.66	1.32
21-Apr-03	1136	11.71	7.99	12.58	1.14
21-Apr-03	1137	11.81	7.91	12.03	0.97
21-Apr-03	1138	11.81	7.91	12.09	0.77
21-Apr-03	1139	11.85	7.88	11.94	0.51
21-Apr-03	1140	11.79	7.93	12.15	0.38
21-Apr-03	1141	12.01	7.75	11.95	0.23
21-Apr-03	1142	12.05	7.72	11.47	0.17

21-Apr-03	1143	12.06	7.70	11.42	0.08
21-Apr-03	1144	12.13	7.64	11.40	0.03
21-Apr-03	1145	11.89	7.85	11.70	0.02
21-Apr-03	1146	11.85	7.87	11.86	-0.10
21-Apr-03	1147	11.83	7.90	11.90	-0.20
21-Apr-03	1148	11.67	8.03	12.27	-0.23
21-Apr-03	1149	11.35	8.28	12.63	-0.26
21-Apr-03	1150	11.39	8.24	13.21	-0.24
21-Apr-03	1203	11.26	8.30	12.89	0.32
21-Apr-03	1204	11.37	8.21	13.01	0.64
21-Apr-03	1205	11.35	8.22	12.83	0.65
21-Apr-03	1206	11.20	8.35	12.91	0.62
21-Apr-03	1207	11.52	8.09	12.85	0.65
21-Apr-03	1208	11.33	8.24	12.46	0.64
21-Apr-03	1209	11.32	8.27	12.86	0.72
21-Apr-03	1210	10.93	8.60	13.16	0.96
21-Apr-03	1211	10.85	8.66	13.59	1.31
21-Apr-03	1212	10.81	8.71	13.63	1.77
21-Apr-03	1213	11.08	8.44	10.73	2.34
21-Apr-03	1214	11.51	8.11	9.45	3.06
21-Apr-03	1215	11.54	8.09	8.84	3.64
21-Apr-03	1216	11.63	8.02	8.84	4.00
21-Apr-03	1217	11.80	7.87	8.69	4.23
21-Apr-03	1218	12.00	7.70	7.73	3.82
21-Apr-03	1219	12.01	7.70	7.75	3.36
21-Apr-03	1220	11.73	7.93	8.00	2.94
21-Apr-03	1221	11.79	7.87	8.19	2.68
21-Apr-03	1222	11.71	7.94	8.27	2.46
21-Apr-03	1223	11.54	8.07	8.32	2.28
21-Apr-03	1224	11.54	8.07	8.76	2.32
21-Apr-03	1225	11.50	8.10	8.59	2.18
21-Apr-03	1226	11.53	8.07	8.87	2.06
21-Apr-03	1227	11.69	7.94	8.69	1.94
21-Apr-03	1228	11.64	7.99	8.30	1.76
21-Apr-03	1229	11.77	7.88	8.37	1.70
21-Apr-03	1230	11.83	7.82	8.20	1.57
21-Apr-03	1231	11.86	7.79	8.12	1.51
21-Apr-03	1232	11.78	7.86	7.96	1.40
21-Apr-03	1233	11.78	7.85	8.16	1.34

[illegible][illegible][illegible][illegible][illegible][illegible]

Table 5-2
Trace Organic Species
Destruction Efficiency Results
Waste Management - Bradley Landfill
Flare #2
April 22, 2003

Species	INLET			OUTLET			
	Flow rate	1751	dscfm	Flow rate	12090.6	dscfm	
Species	Conc. (ppb)	Conc. (mg/dscf)	Em. Rate (lb/hr)	Conc. (ppb)	Conc. (mg/dscf)	Em. Rate (lb/hr)	Dest. Eff. (%)
Hydrogen Sulfide	45300	1.85E+00	4.28E-01	< 500	< 2.04E-02	< 3.26E-02	> 92.38
Benzene	963	8.98E-02	2.08E-02	< 0.3	< 2.80E-05	< 4.47E-05	> 99.78
Benzylchloride	< 40	< 6.07E-03	< 1.41E-03	< 0.8	< 1.21E-04	< 1.94E-04	NA
Chlorobenzene	279	3.77E-02	8.73E-03	< 0.3	< 4.05E-05	< 6.48E-05	> 99.26
Dichlorobenzenes	759	1.33E-01	3.09E-02	< 1.1	< 1.93E-04	< 3.09E-04	> 99.00
1,1-dichloroethane	121	1.43E-02	3.32E-03	< 0.3	< 3.55E-05	< 5.68E-05	> 98.29
1,2-dichloroethane	< 16	< 1.89E-03	< 4.38E-04	< 0.3	< 3.55E-05	< 5.68E-05	NA
1,1-dichloroethylene	< 16	< 1.85E-03	< 4.30E-04	< 0.3	< 3.48E-05	< 5.56E-05	NA
Dichloromethane	< 20	< 2.03E-03	< 4.71E-04	< 0.3	< 3.05E-05	< 4.87E-05	NA
1,2-Dibromoethane	< 16	< 3.59E-03	< 8.32E-04	< 0.3	< 6.74E-05	< 1.08E-04	NA
Perchloroethene	613	1.74E-01	4.02E-02	1.46	4.14E-04	6.61E-04	98.36
Carbon tetrachloride	< 20	< 3.68E-03	< 8.53E-04	< 0.2	< 3.68E-05	< 5.89E-05	NA
Toluene	3670	4.04E-01	9.35E-02	0.96	1.06E-04	1.69E-04	99.82
1,1,1-trichloroethane	< 16	< 2.54E-03	< 5.89E-04	< 0.2	< 3.18E-05	< 5.08E-05	NA
Trichloroethene	200	3.13E-02	7.25E-03	< 0.2	< 3.13E-05	< 5.01E-05	> 99.31
Chloroform	< 16	< 2.28E-03	< 5.27E-04	< 0.2	< 2.84E-05	< 4.55E-05	NA
Vinyl Chloride	454	3.39E-02	7.85E-03	< 0.3	< 2.24E-05	< 3.58E-05	> 99.54
m+p-xylenes	11700	1.48E+00	3.43E-01	< 0.5	< 6.33E-05	< 1.01E-04	> 99.97
o-xylene	3290	4.17E-01	9.65E-02	< 0.3	< 3.80E-05	< 6.08E-05	> 99.94
TNMHC	2343000	4.48E+01	1.04E+01	2340	4.47E-02	7.16E-02	99.31

Note: All values preceded by "<" are below the detection limit. The reported values are the detection limit.

NA-Not Applicable: Destruction efficiency can not be calculated since both inlet and outlet values are below the detection limit.

APPENDIX C - Laboratory Results



AtmAA Inc.

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LABORATORY ANALYSIS REPORT

environmental consultants
laboratory services

Organic Carbon Analysis in Water Impingers, and Methane and TGNMO Analysis in
SUMMA Canister Samples from Impinger/Canister Train Sample Collection

Report Date: April 29, 2003

Client: Horizon / Waste Management

P.O. No.: Verbal

Client Project No.: W07-035

Source Location: Bradley Landfill / Sun Valley CA.

Source ID: Flare 2 outlet

Date Received: April 22, 2003

Date Analyzed: April 23, & 25, 2003

ANALYSIS DESCRIPTION

Methane & TGNMO were measured by flame ionization detection/total combustion analysis (FID/TCA), Method 25. Organic carbon in water impinger samples were measured by Dohrman total organic carbon analyzer, water FID/TCA.

AtmAA Lab No.	Sample ID	Canister	Canister	Canister	Impinger Organic Carbon as	Impinger	P ₁	P ₂
		Methane	Ethane	TGNMO	Methane	Volume		
(Concentration in ppmv)								
01123-8	SUMMA S13	<1	<1	1.41	---	---	567	804
	Impinger H96	---	---	---	1.24	2.90	---	---
01123-9	SUMMA S15	<1	<1	1.18	---	---	550	803
	Impinger H94	---	---	---	0.85	2.98	---	---

TGNMO is total gaseous non-methane organics (excluding ethane), reported as ppm methane.

** Note - Impinger sample results are not blank corrected. The field blank (impinger H92) contained 0.64 ug carbon as methane, corresponding to 0.21 ppm methane for a 4.66 liter P₁ and P₂ are initial and final pressures measured in mm Hg.*

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project No.: W07-035
Date Received: April 22, 2003
Date Analyzed: April 23, & 25, 2003

Components	Sample ID	Repeat Analysis		Mean Conc.	% Diff. From Mean
		Run #1	Run #2		
		(Concentration in ppmv)			
Methane	SUMMA S13	<1	<1	---	---
	SUMMA S15	<1	<1	---	---
Ethane	SUMMA S13	<1	<1	---	---
	SUMMA S15	<1	<1	---	---
TGNMO	SUMMA S13	1.45	1.36	1.41	3.2
	SUMMA S15	1.21	1.14	1.18	3.0
Impinger TOC	Impinger H96	1.24	1.24	1.24	0.0
	Impinger H94	0.91	0.78	0.85	7.7

A set of 2 canister/impinger samples, laboratory numbers 01123-(8 & 9), was analyzed for methane, total gaseous non-methane organics (TGNMO), and TOC. Agreement between repeat analysis is a measure of precision and is shown in the column "% Difference from Mean". Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 4 repeat measurements from the sample set of 2 canister/impinger samples is 3.5%.





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LABORATORY ANALYSIS REPORT

CO, CH₄, CO₂, TGNMO, and Ethane Analysis in Tanks
and Traps by SCAQMD Method 25 (FID/TCA)

Report Date: April 29, 2003
Client: Horizon / Waste Management
P.O. No.: Verbal
Client Project No.: W07-035
Source Location: Bradley Landfill / Sun Valley CA.
Source ID: Flare 2 inlet

Date Received: April 22, & 25, 2003
Date Analyzed: April 24, & 25, 2003

AtmAA Lab No.	Sample ID			tank CO	tank CH ₄	tank CO ₂	tank TGNMO	CO ₂ in ICV	tank Oxygen	P ₁	P ₂	
				(Concentrations in ppmv)								(%)
	Tank	Trap	ICV									
01123-10	H	K	7	<20	288000	258000	308	5460	3.34	378	803	
01123-11	B	Y	F	<20	298000	268000	321	5270	2.74	365	802	

trap burn system blank H

8.69

TGNMO is total gaseous non-methane organics (excluding ethane) reported as ppm methane.
No ethane was found at a lower detection limit of 20 ppmv as methane.

P₁ - Initial Pressure, mm Hg

P₂ - Final Pressure, mm Hg


Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Client Project No.: W07-035

Date Received: April 22, & 25, 2003

Date Analyzed: April 24, & 25, 2003

Components	Sample ID	Repeat Analysis		Mean Conc.	% Diff. From Mean
		Run #1	Run #2		
(Concentration in ppmv)					
CO	TK H	<20	<20	---	---
CH ₄	TK H	287000	289000	288000	0.34
CO ₂	TK H	257000	258000	258000	0.10
TGNMO	TK H	306	311	308	0.80
CO ₂ in ICV (in trap, transfer tanks)	ICV 7	5410	5510	5460	0.93
(Concentration in %v)					
Oxygen	TK E	3.31	3.36	3.34	0.78

A set of 2 TCA samples, laboratory numbers 01123-(10 & 11), was analyzed for CO, CH₄, CO₂, O₂, and total gaseous non-methane organics (TGNMO). Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 5 repeat measurements from the sample set of 2 TCA samples is 0.59%.

Gas standards (containing CO, CH₄, CO₂ and propane) used for TCA analyses, were prepared and certified by Praxair.





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LABORATORY ANALYSIS REPORT

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SCAQMD Rule 1150.1 Components Analysis in Inlet Gas Tedlar Bag Sample

Report Date: April 30, 2003

Client: Horizon

Project Location: WMNA / Bradley LF #2

Client Project No.: W07-035

Date Received: April 23, 2003

Date Analyzed: April 23 & 24, 2003

AtmAA Lab No.: 01123-12

Sample I.D.: W07035-F2

TB-IN-A

Components

Hydrogen sulfide

(Concentration in ppmv)

45.3

(Concentration in ppbv)

Benzene	963
Benzylchloride	<40
Chlorobenzene	279
Dichlorobenzenes*	759
1,1-dichloroethane	121
1,2-dichloroethane	<16
1,1-dichloroethylene	<16
Dichloromethane	<20
1,2-dibromoethane	<16
Perchloroethene	613
Carbon tetrachloride	<20
Toluene	3670
1,1,1-trichloroethane	<16
Trichloroethene	200
Chloroform	<16
Vinyl chloride	454
m + p-xylenes	11700
o-xylene	3290

* total amount containing meta, para, and ortho isomers


Michael L. Porter
Laboratory Director



AtmAA Inc.

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LABORATORY ANALYSIS REPORT

Hydrogen Sulfide and Reduced Sulfur Compounds
Analysis in Inlet Tedlar Bag Sample

Report Date: April 30, 2003
Client: Horizon
Project Location: WMNA / Bradley LF #2
Client Project No.: W07-035
Date Received: April 23, 2003
Date Analyzed: April 23, 2003

ANALYSIS DESCRIPTION

Hydrogen sulfide was analyzed by gas chromatography with a Hall electrolytic conductivity detector operated in the oxidative sulfur mode. All other components were measured by GC/ Mass Spec.

AtmAA Lab No.:	01123-12	
Sample I.D.:	W07035-F2	
	TB-IN-A	(repeat)
<u>Components</u>	<i>(Concentration in ppmv)</i>	
Hydrogen sulfide	42.2	48.4
Carbonyl sulfide	<0.05	<0.05
Methyl mercaptan	0.14	0.15
Ethyl mercaptan	0.097	0.10
Dimethyl sulfide	0.17	0.18
Carbon disulfide	<0.05	<0.05
isopropyl mercaptan	<0.06	<0.06
n-propyl mercaptan	<0.06	<0.06
Dimethyl disulfide	<0.05	<0.05
TRS	42.6	48.8

TRS - total reduced sulfur


Michael L. Porter
Laboratory Director



AtmAA Inc.

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LABORATORY ANALYSIS REPORT

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SCAQMD Rule 1150.1 Components Analysis in Outlet Tedlar Bag Sample

Report Date: April 30, 2003

Client: Horizon

Project Location: WMNA / Bradley LF #1

Client Project No.: W07-035

Date Received: April 23, 2003

Date Analyzed: April 23 & 24, 2003

AtmAA Lab No.: 01123-13

Sample I.D.: W07035-F3

TB-OUT-A

Components

(Concentration in ppbv)

Hydrogen sulfide	< 500
Benzene	< 0.3
Benzylchloride	< 0.8
Chlorobenzene	< 0.3
Dichlorobenzenes*	< 1.1
1,1-dichloroethane	< 0.3
1,2-dichloroethane	< 0.3
1,1-dichloroethylene	< 0.3
Dichloromethane	< 0.3
1,2-dibromoethane	< 0.3
Perchloroethene	1.46
Carbon tetrachloride	< 0.2
Toluene	0.96
1,1,1-trichloroethane	< 0.2
Trichloroethene	< 0.2
Chloroform	< 0.2
Vinyl chloride	< 0.3
m + p-xylenes	< 0.5
o-xylene	< 0.3

* total amount containing meta, para, and ortho isomers

Michael L. Porter
Laboratory Director

CHAIN OF CUSTODY RECORD

Client/Project Name Waste Mgt. / Bradley LF #2			Project Location San Valley, CA		
Project No. W07-035			Field Logbook No.		
Sampler: (Signature) <i>[Signature]</i>			Chain of Custody Tape No.		
Sample No. / Identification	Date	Out C Time	Lab Sample Number	Type of Sample	REMARKS
Summings B	4/22/03		01123-8	6 L Summings	X H98 Flare 2 Out
SIS			9	↓	X H94 ↓
Tank H			10	12 L Tank	X K X Flare 2 In
B			11	↓	X Y X ↓
W0735-F2-TB-IN-A			12	5 L Tufflav Big	X X Flare 2 In
W0735-F2-TB-IN-B				↓	Holder 93 Backup
W0735-F2-TB-OUT-A			13	↓	X Flare 2 Out
W0735-F2-TB-OUT-B				↓	Holder 93 Backup
Relinquished by: (Signature) <i>[Signature]</i>			Date 4/22	Time 1430	Received by: (Signature) <i>[Signature]</i>
Relinquished by: (Signature)			Date	Time	Received by: (Signature)
Relinquished by: (Signature)			Date	Time	Received for Laboratory: (Signature)
Sample Disposal Method:			Disposed of by: (Signature)		
SAMPLE COLLECTOR HORIZON AIR MEASUREMENT SERVICES, INC 996 Lawrence Drive, Suite 108 Newbury Park, CA 91320 (805) 498-8781 Fax (805) 498-3173			ANALYTICAL LABORATORY Atm AA Cajonbasas CA		
			Nº 7860		

SCAMP M25.3
SCAMP M25.1 (TCA complete)
SCAMP M300.9 (TCA)
Rule 1150.1 List
Twp / Imp #
02
Blank H2O # H92

DATA SHEET FOR PARTICULATE MATTER SCAQMD METHOD 5.1

DATE SAMPLED: 04/21-23/03

RUN #1

DATE EXTRACTED: 04/22-24/03

	SAMPLE ID	BEAKER/ FILTER ID	VOLUME	INITIAL	FINAL	NET WEIGHT(g)
A - FILTER CATCH	W07035-5.1-F2-PF-1	G00184	NA	0.1116	0.1123	0.0007
FILTER ACID						0.0000
FILTER SULFATE						0.0000
B - PROBE CATCH						0.0000
PROBE ACID						0.0000
PROBE SULFATE						0.0000
C - IMP.CATCH(INSOL)	W07035-5.1-F2-EF-1	G03026	689	0.0845	0.0858	0.0013
INSOLUBLE ACID						0.0000
INSOLUBLE SULFATE						0.0000
D - IMP. CATCH (SOL)	W07035-5.1-F2-DI-1	030039	689	29.4308	29.4338	0.0030
SOLUBLE ACID						0.0000
SOLUBLE SULFATE						0.0000
E - ORGANIC EXTRACT	W07035-5.1-F2-MC-1	030040	125	30.3691	30.3689	0.0000
<hr/>						
TOTAL PARTICULATE	(A+B+C+D+E)					0.0050
SOLID PARTICULATE	(A+B+C+D)					0.0050

DATA SHEET FOR PARTICULATE MATTER SCAQMD METHOD 5.1

DATE SAMPLED: 04/21-23/03

RUN #2

DATE EXTRACTED: 04/22-24/03

	SAMPLE ID	BEAKER/ FILTER ID	VOLUME	INITIAL	FINAL	NET WEIGHT(g)
A - FILTER CATCH	W07035-5.1-F2-PF-2	G00236	NA	0.0833	0.0842	0.0009
FILTER ACID						0.0000
FILTER SULFATE						0.0000
B - PROBE CATCH						0.0000
PROBE ACID						0.0000
PROBE SULFATE						0.0000
C - IMP.CATCH(INSOL)	W07035-5.1-F2-EF-2	G03027	556	0.0826	0.0835	0.0009
INSOLUBLE ACID						0.0000
INSOLUBLE SULFATE						0.0000
D - IMP. CATCH (SOL)	W07035-5.1-F2-DI-2	030032	556	30.4355	30.4383	0.0028
SOLUBLE ACID						0.0000
SOLUBLE SULFATE						0.0000
E - ORGANIC EXTRACT	W07035-5.1-F2-MC-2	030038	125	30.5495	30.5494	0.0000
<hr/>						
TOTAL PARTICULATE	(A+B+C+D+E)					0.0046
SOLID PARTICULATE	(A+B+C+D)					0.0046

DATA SHEET FOR PARTICULATE MATTER SCAQMD METHOD 5.1

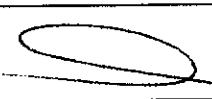
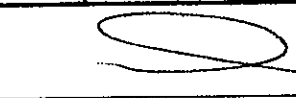
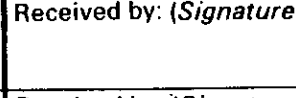
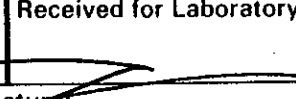

DATE SAMPLED: 04/21-23/03

BLANK

DATE EXTRACTED: 04/22-24/03

	SAMPLE ID	BEAKER/ FILTER ID	VOLUME	INITIAL	FINAL	NET WEIGHT(g)
A - FILTER CATCH FILTER ACID FILTER SULFATE	PF-BLANK	G003021	NA	0.0846	0.0845	0.0000 0.0000
B - PROBE CATCH PROBE ACID PROBE SULFATE						0.0000 0.0000
C - IMP.CATCH(INSOL) INSOLUBLE ACID INSOLUBLE SULFATE	EF-BLANK	G03023	1000	0.0856	0.0852	0.0000 0.0000 0.0000
D - IMP. CATCH (SOL) SOLUBLE ACID SOLUBLE SULFATE	DI-BLANK	030024	1000	29.3816	29.3816	0.0000 0.0000 0.0000
E - ORGANIC EXTRACT	MC-BLANK	030027	125	30.4833	30.4830	0.0000
<hr/>						
TOTAL PARTICULATE	(A+B+C+D+E)					0.0000
SOLID PARTICULATE	(A+B+C+D)					0.0000

CHAIN OF CUSTODY RECORD

Client/Project Name WASTE MANAGEMENT / BRADLEY L.F.			Project Location SUN VALLEY, CA			ANALYSES SCAQM 5.1					
Project No. 1V07-035			Field Logbook No.								
Sampler: (Signature) 			Chain of Custody Tape No.								
Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	REMARKS						
1V07-035-F2-5.1-D1-1	04.23.03				✓						
-PF.1					✓						
-D-2					✓						
-PF-2					✓						
Relinquished by: (Signature) 			Date 04.23.03	Time 0500	Received by: (Signature) 			Date	Time		
Relinquished by: (Signature)			Date	Time	Received by: (Signature)			Date	Time		
Relinquished by: (Signature)			Date	Time	Received for Laboratory: (Signature) 			Date 04.23.03	Time 0500		
Sample Disposal Method:			Disposed of by: (Signature) 					Date	Time		
SAMPLE COLLECTOR HORIZON AIR MEASUREMENT SERVICES, INC 996 Lawrence Drive, Suite 108 Newbury Park, CA 91320 (805) 498-8781 Fax (805) 498-3173				ANALYTICAL LABORATORY HORIZON AIR MEAS. SERVICES IN HOUSE					Nº 7959		

0.00

APPENDIX D - Field Data Sheets

Facility: Bradley Handfill
Source: Flare #2
Job #: W07-035
Date: 4/22/03
Operator: RV 15B

Baro. Press: 29.15
Static Press: + 7.0 / + 7.0
Pitot Tube #: 2 feet
Pitot Tube Type: std
Magnahelic: #1

D₁ upstream: 5
D₁ downstream: 8
Stack Diameter: 10

Initial:

Final:

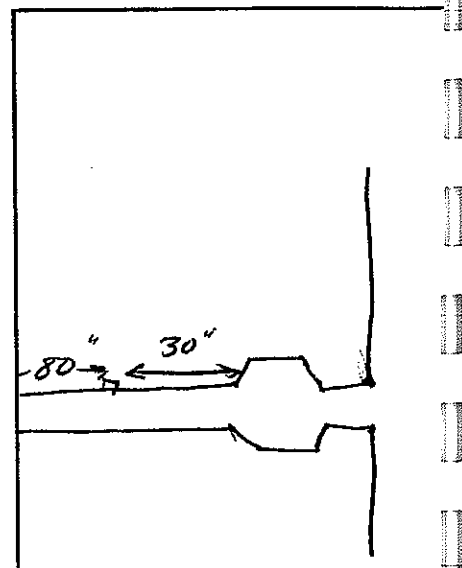
Run #: Enter 142[illegible]

0.025% 0.6229 112.0 114.0
SB 0.8957 SB SB
Services, Inc. SB

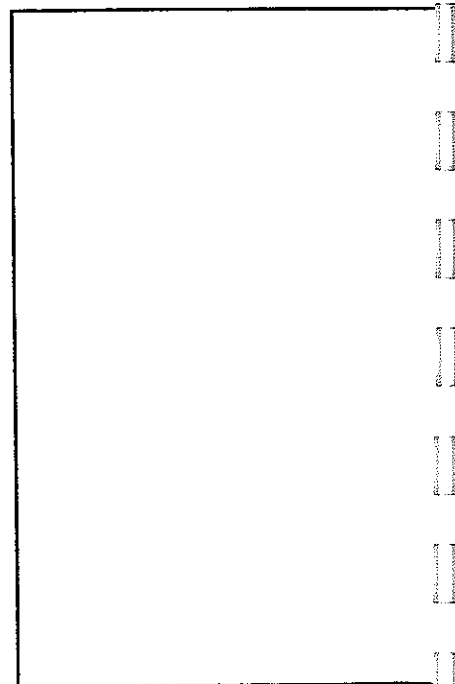
Horizon Air Measurement Services, Inc.

Velocity Data Sheets - Method 2 (H:\WPDOCS\FORMS\VELOCITY DATA SHEET - M2)

Side View



Top View



PLANT Bradley and NW
DATE 4-23-03
LOCATION Son Valley, CA
OPERATOR EV
SOURCE Flare #2
RUN NO. 1 - M4.1
SAMPLE BOX NO. _____
TIME START 920

METER BOX NO. 5
METER ΔH @ 1.6807
Y= 0.9873
PROBE I.D. NO. NA
NOZZLE DIAMETER, in. NA
STACK DIAMETER, in. NA
PROBE HEATER SETTING NA
HEATER BOX SETTING NA
 ΔC_p FACTOR NA
FILTER NO. NA

ASSUMED MOISTURE, % 102
 AMBIENT TEMPERATURE 68
 BARO. PRESS. 29.15
 STATIC PRESS. N/A
 NOMAGRAPH INDEX N/A

METER 0.000 @ 15 in. Hg
PITOTS @ in. Hg
ORSAT

[illegible]

TIME END = 1020

Volume of Liquid Water Collected	Impinger Volume				Silica Gel Wght.
	1	2	3	4	5
Final	128	103	3		287
Initial	100	100	0		274
Liquid Collected	28	3	3		13
Total Vol. Collected					47

Meter 6.000 @ 15 in. Hg
Pitots @ in. Hg
Orsat

Orsat Meas.	Time	CO ₂	O ₂	CO	N ₂
1					
2					
3					

Nozzle Cal	D ₁	D ₂	D ₃	Average

PLANT Bradley Landfill
DATE 4/22/03
LOCATION Sun Valley, CA
OPERATOR RV
SOURCE Flare #2
RUN NO. 2-M4.1
SAMPLE BOX NO. _____
TIME START 1115

METER BOX NO. 5
METER ΔH @ 1.6807
Y= 0.5873
PROBE I.D. NO. 2
NOZZLE DIAMETER, in. -
STACK DIAMETER, in. -
PROBE HEATER SETTING -
HEATER BOX SETTING -
 ΔC_p FACTOR -
FILTER NO. -

ASSUMED MOISTURE, % 60
 AMBIENT TEMPERATURE 68
 BARO. PRESS. 29.5
 STATIC PRESS. -
 NOMOGRAPH INDEX -

METER 0.000 @ 15 in. Hg
PITOTS _____ @ _____ in. Hg
ORSAT _____

[illegible]

TIME END = 1215

Volume of Liquid Water Collected	Impinger Volume				Silica Gel Wght.
	1	2	3	4	5
Final	136	124	2		267
Initial	100	100	0		260
Liquid Collected	36	4	2		14
Total Vol. Collected					56

SB

Meter 0.000 @ 15 in. Hg
Pitots @ in. Hg
Orsat

Orsat Meas.	Time	CO ₂	O ₂	CO	N ₂
1					
2					
3					

Nozzle Cal	D ₁	D ₂	D ₃	Average

054

PARTICULATE FIELD DATA

PLANT BRADLEY LAM 2611
 DATE 4/22/03
 LOCATION SUN VALLEY, CA
 OPERATOR RD, CH
 SOURCE Flare #2
 RUN NO. 1-MS.1
 SAMPLE BOX NO. C4

METER BOX NO. 4
 METER ΔH @ 17693
 Y= 09876
 PROBE I.D. NO. 10-2
 NOZZLE DIAMETER, in. 1.094 0.976 C92
 STACK DIAMETER, in. 96
 PROBE HEATER SETTING NA
 HEATER BOX SETTING NA
 Δ Cp FACTOR 0.84
 FILTER NO. 00084

ASSUMED MOISTURE, % 10
 AMBIENT TEMPERATURE 26.8
 BARO. PRESS. 29.15
 STATIC PRESS. 0.08
 NOMOGRAPH INDEX 320

PRE TEST LEAK CHECKS
 METER 0.000 @ 15 in. Hg
 PITOTS ✓✓ @ 340 in. Hg
 ORSAT

P#	TIME	T _s °F	ΔP in H ₂ O	√ΔP	ΔH in H ₂ O	Vm ft ³	T _{in} °F	T _{out} °F	OVEN °F	IMP. OUT °F	VAC. (in Hg)
A12	0.0	1639	0.015		3.2	304.503	62	62	-	58	4
11	2.5	1642	0.015		3.2	307.1	65	62	-	54	4
10	5	1649	0.015		3.2	310.0	67	63		54	4
9	7.5	1665	0.015		3.2	312.0	69	63		54	4
8	10	1663	0.015		3.2	314.1	69	63		53	4
7	12.5	1662	0.015		3.2	316.8	71	64		52	4
6	15.0	1675	0.015		3.2	318.8	72	64		53	4
5	17.5	1666	0.015		3.2	322.2	72	65		54	4
4	20	1649	0.015		3.2	324.7	72	66		55	4
3	22.5	1653	0.015		3.2	327.2	72	66		56	4
2	25	1650	0.015		3.2	329.7	73	66		55	4
1	27.5	1642	0.015		3.2	333.2	73	66		57	4
B12	30	1657	0.015		3.2	334.450	65	65		54	4
11	2.5	1667	0.015		3.2	336.8	73	65		58	4
10	5	1653	0.015		3.2	339.3	74	67		56	4
9	7.5	1665	0.015		3.2	341.7	74	67		55	4
8	10	1657	0.015		3.2	344.2	75	67		58	4
7	12.5	1670	0.015		3.2	346.7	75	68		58	4
6	15	1684	0.015		3.2	349.2	75	68		56	4
5	17.5	1722	0.015		3.2	351.7	75	69		56	4
4	20	1681	0.015		3.2	354.3	75	69		55	4
3	22.5	1656	0.015		3.2	356.8	75	69		56	4
2	25	1652	0.015		3.2	359.2	76	69		55	4
1	27.5	1618	0.015		3.2	361.8	76	69		55	4
SOP	30					364.458					
Avg.		1636.5		0.1225	3.2	59.955	68.9				

TIME END = 1043 1652.8 SB SB

Volume of Liquid Water Collected	Impinger Volume				Silica Gel Wght.
	1	2	3	4	5
Final	177	128	10		274
Initial	100	100	0		251
Liquid Collected	77	28	10		23
Total Vol. Collected					138

SB

POST TEST LEAK CHECKS

Meter 0.000 @ 10 in. Hg
 Pitots ✓✓ @ 2312 in. Hg
 Orsat

Orsat Meas.	Time	CO ₂	O ₂	CO	N ₂
1					
2					
3					
Nozzle Cal	D ₁	D ₂	D ₃	Average	

PARTICULATE FIELD DATA

PLANT Bradley Landfill
 DATE 4/22/03
 LOCATION Sun Valley, CA
 OPERATOR RJ/CMS
 SOURCE Plant 2
 RUN NO. 2-MS.1
 SAMPLE BOX NO. C6
 TIME START 1120

METER BOX NO. 4
 METER ΔH @ 1.7693
 Y= 0.9876
 PROBE I.D. NO. 10-3
 NOZZLE DIAMETER, in. 0.976
 STACK DIAMETER, in. 96
 PROBE HEATER SETTING -
 HEATER BOX SETTING -
 Δ Cp FACTOR 0.84
 FILTER NO. -

ASSUMED MOISTURE, % 10
 AMBIENT TEMPERATURE 68
 BARO. PRESS. 29.5
 STATIC PRESS. 23.08
 NOMOGRAPH INDEX 22

PRE TEST LEAK CHECKS
 METER 0.000 @ 15 in. Hg
 PITOTS 1/4 @ 23.122 in. Hg
 ORSAT -

P#	TIME	T _s °F	ΔP in H ₂ O	√ΔP	ΔH in H ₂ O	V _m ft ³	T _{in} °F	T _{out} °F	OVEN °F	IMP. OUT °F	VAC. (in Hg)
A-12	1120	1633	0.015		3.2	364.660	66	66	-	60	5
11	2.5	1666	0.015		3.2	367.0	70	66		50	5
10	5	1676	0.015		3.2	369.2	70	66		50	5
9	7.5	1654	0.015		3.2	371.5	71	66		51	5
8	10	1658	0.015		3.2	374.1	74	66		50	5
7	12.5	1695	0.015		3.2	376.7	75	66		54	5
6	15	1655	0.015		3.2	379.2	74	67		56	5
5	17.5	1629	0.015		3.2	381.4	74	67		57	5
4	20	1600	0.015		3.2	383.9	74	68		56	6
3	22.5	1603	0.015		3.2	386.5	74	68		57	6
2	25	1585	0.015		3.2	388.9	74	69		55	6
1	27.5	1595	0.015		3.2	391.5	74	69		55	6
B-12	30	1648	0.015		3.2	393.955	67	68		58	6
11	25	1660	0.015		3.2	396.8	71	66		57	6
10	5	1644	0.015		3.2	399.0	72	66		58	6
9	2.5	1712	0.015		3.2	401.6	73	67		58	6
8	10	1638	0.015		3.2	403.0	74	67		58	6
7	12.5	1648	0.015		3.2	406.3	74	68		57	6
6	15	1656	0.015		3.2	409.8	75	68		54	6
5	17.5	1644	0.015		3.2	411.5	75	68		54	6
4	20	1673	0.015		3.2	414.1	75	69		53	6
3	22.5	1651	0.015		3.2	416.7	76	69		55	6
2	25	1655	0.015		3.2	419.3	76	69		54	6
1	27.5	1660	0.015		3.2	421.9	76	70		54	6
SOP	30					424.510					
Avg.		1644.4		0.1225	3.20	59.850	70.4				
TIME END = <u>1233</u> SB SB SB SB SB											

Volume of Liquid Water Collected	Impinger Volume				Silica Gel Wght.
	1	2	3	4	5
Final	192	120	10		278
Initial	100	100	0		265
Liquid Collected	92	20	10		13
Total Vol. Collected					135

SB

POST TEST LEAK CHECKS

Meter 0.000 @ 12 in. Hg
 Pitots 1/4 @ 3/3 in. Hg
 Orsat -

Orsat Meas.	Time	CO ₂	O ₂	CO	N ₂
1					
2					
3					
Nozzle Cal	D ₁	D ₂	D ₃	Average	

056

**TOTAL COMBUSTION ANALYSIS
SCAQMD METHOD 25
FIELD SAMPLING DATA SHEET**

Job #: W07-035
 Facility: BRADLEY LANDFILL
 Location: SUN VALLEY, CA
 Date: 4-22-03
 Operator: RV, SB, CSM

Control Device: FLARE # 2
 Sample Location: INLET
 Ambient Temp.: 75°
 Baro. Pressure: 29.15

SAMPLE A
 Tank #: H Trap #: K
 Initial Vacuum: 1.3 Torr
 Final Vacuum: _____
 Start Time: 920

SAMPLE B
 Tank #: B Trap #: Y
 Initial Vacuum: 1.3 Torr
 Final Vacuum: _____
 End Time: 1020

TIME (min.)	VACUUM ("Hg)	FLOW (cc/min)
00	28	
05	28	
10	27	
15	25	
20	23	
25	22	
30	21	
35	19	
40	18	
45	17	
50	15	
55	14	
60	13	

TIME (min.)	VACUUM ("Hg)	FLOW (cc/min)
00	29	
05	29	
10	28	
15	27	
20	25	
25	24	
30	23	
35	22	
40	20	
45	19	
50	17	
55	16	
60	15	

LEAK RATE

Pre Test : ✓
 Post Test: ✓

**TOTAL COMBUSTION ANALYSIS
SCAQMD METHOD 25
FIELD SAMPLING DATA SHEET**

Job #: W07-035
 Facility: BRADLEY LANDFILL
 Location: SUN VALLEY
 Date: 4-22-03
 Operator: CSM, RV, SB

Control Device: FLARE # 2
 Sample Location: OUTLET
 Ambient Temp.: 75°
 Baro. Pressure: 29.15

SAMPLE A

Tank #: S13 Trap #: H96
 Initial Vacuum: 3.6 Torr
 Final Vacuum: 6 in Hg
 Start Time: 9:30

SAMPLE B

Tank #: S15 Trap #: H94
 Initial Vacuum: 3.6 Torr
 Final Vacuum: 6 in Hg
 End Time: 10:40

TIME (min.)	VACUUM ("Hg)	FLOW (cc/min)
00	30	SET
05	28	
10	26	
15	24	
20	22	
25	20	
30	18	
35	16	
40	14	
45	12	
50	10	
55	8	
60	6	✓

TIME (min.)	VACUUM ("Hg)	FLOW (cc/min)
00	30	SET
05	28	
10	26	
15	24	
20	22	
25	20	
30	18	
35	16	
40	14	
45	12	
50	10	
55	8	
60	6	✓

LEAK RATE

Pre Test : ✓
 Post Test: ✓

[illegible]Run Number: /

Date: 4/22/23

Plant: Bradley Landfill

Sampling Location: Flare # 2 Outlet

Barometric Pressure: 29.15

Ambient Temp. °C: 65°F Stack Temp. °C: 1600°F

Operator: CSM

[illegible]**अ**

$$\% \text{ Dev.} = \left(\frac{Q - Q_{avg}}{Q_{avg}} \right) 100; \text{ must be } \leq 10\%$$

CEM TEMPERATURE DATA

Facility: Broadway Landfill
 Job No.: W07-033
 Source: Flare #2

Date: 4/22/03
 Run #: 1, 2

Probe Temp Settings: >250°F
 Heated Line Temp Settings: >250°F

		TEMPERATURES °F		
		Time	Condenser Outlet	Probe Teflon Line
1	A1	00	35	>250- >250
2		10	36	
3		20	35	
4		30	35	
5		40	35	
6		50	35	
7		60	35	
8	A2	00	35	
9		10	35	
10		20	35	
11		30	35	
12		40	35	
13		50	35	
14		60	35	↓ ↓
15				

APPENDIX E - Calibration Information

CERTIFICATE OF ANALYSIS**CUSTOMER** HORIZON AIR MEASUREMENTS**DATE** 11/21/02**P.O NUMBER** 8557**REF. NUMBER** 73184900**REQUESTED COMPOSITION**

GAS	CONCENTRATION
NITROGEN DIOXIDE (AS NOX)	19 ppm
AIR	BALANCE
ANALYTICAL ACCURACY	±2 %
NO	

ANALYTICAL METHOD

INSTRUMENT	ANALYTICAL PRINCIPLE
Thermo Env. 42H S/N 42H-44979-273	Chemiluminescence

Thermo Env. 42H S/N 42H-44979-273	Chemiluminescence
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VALUES NOT VALID BELOW 150 PSIG.

SRM UNCERTAINTY ± 2 %

NOX CONC. LAST CERTIFIED ON 10-19-02 WAS 17.9 ppm.

THIS CYLINDER NO.	SA 15361
CYLINDER PRESSURE	1250 PSIG
EXPIRATION DATE	05-21-03
CLASSIFICATION	PRIMARY STANDARD
BATCH NUMBER	N/A
LOT NUMBER	109210507
PART NUMBER	EV AINK19MP-AS
CYLINDER SIZE	AS CGA 660 85 CFT

CERTIFIED CONCENTRATION

NITROGEN DIOXIDE (AS NOX)	18.1 ppm
AIR	BALANCE
ANALYTICAL ACCURACY	±2 %
NO	0.4 ppm

ANALYZED BY

PHU TIEN NGUYEN

CERTIFIED BY

ELIZA GOMEZ

IMPORTANT

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER HORIZON AIR

P.O NUMBER

REFERENCE STANDARD

COMPONENT

NIST SRM NO.

CYLINDER NO.

CONCENTRATION

NITRIC OXIDE GMIS

vs. SRM#2629

SA 18096

12.7 ppm

ANALYZER READINGS**R=REFERENCE STANDARD****Z=ZERO GAS****C=GAS CANDIDATE**

1. COMPONENT	NITRIC OXIDE	GMIS	ANALYZER MAKE-MODEL-S/N		Thermo Env. 42H S/N 42H-44979-273										
ANALYTICAL PRINCIPLE			Chemiluminescence		LAST CALIBRATION DATE										
FIRST ANALYSIS DATE			09/05/02		SECOND ANALYSIS DATE										
Z	-0.04	R	15.58	C	12.59	CONC.	10.27	Z	-0.03	R	16.90	C	13.57	CONC.	10.20
R	15.62	Z	-0.04	C	12.58	CONC.	10.23	R	16.88	Z	-0.03	C	13.50	CONC.	10.16
Z	-0.04	C	12.65	R	15.72	CONC.	10.23	Z	-0.03	C	13.57	R	16.85	CONC.	10.23
U/M			ppm		MEAN TEST ASSAY		10.24 ppm	U/M			ppm		MEAN TEST ASSAY		10.20 ppm

NOx values for reference only.

All values not valid below 150 psig.

THIS CYLINDER NO. CC 150046

HAS BEEN CERTIFIED ACCORDING TO SECTION

EPA-600/R97/121

OF TRACEABILITY PROTOCOL NO.

Rev. 9/97

PROCEDURE

G1

CERTIFIED ACCURACY ± 1 % NIST TRACEABLE

CYLINDER PRESSURE 2000 PSIG

CERTIFICATION DATE 09/13/02

EXPIRATION DATE 09/13/04 TERM 24 MONTHS

CERTIFIED CONCENTRATION

NITRIC OXIDE 10.2 ppm

NITROGEN BALANCE

NOx 10.4 ppm

ANALYZED BY

PHU TIEN NGUYEN

CERTIFIED BY

ELIZA GOMEZ

IMPORTANT

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER HORIZON AIR

P.O NUMBER

REFERENCE STANDARD

COMPONENT
NITRIC OXIDE GMIS

NIST SRM NO.
vs. SRM#1683

CYLINDER NO.
CC 95448

CONCENTRATION
22.4 ppm

ANALYZER READINGS

R=REFERENCE STANDARD

Z=ZERO GAS

C=GAS CANDIDATE

1. COMPONENT	NITRIC OXIDE	GMIS	ANALYZER MAKE-MODEL-S/N	Thermo Env. 42H S/N 42H-44979-273
ANALYTICAL PRINCIPLE		Chemiluminescence	LAST CALIBRATION DATE 08/09/02	
FIRST ANALYSIS DATE		08-20-02	SECOND ANALYSIS DATE 08-27-02	
Z 0	R 22.6	C 21.0	CONC. 20.8	Z 0.0 R 22.66 C 21.02 CONC. 20.8
R 22.5	Z 0	C 21.0	CONC. 20.9	R 22.65 Z 0.0 C 21.03 CONC. 20.8
Z 0	C 21.1	R 22.7	CONC. 20.8	Z 0.0 C 21.03 R 22.67 CONC. 20.8
U/M	ppm	MEAN TEST ASSAY	20.8	U/M ppm MEAN TEST ASSAY 20.8

NOx values for reference only.

All values not valid below 150 psig.

THIS CYLINDER NO. SA 7833

HAS BEEN CERTIFIED ACCORDING TO SECTION

OF TRACEABILITY PROTOCOL NO.

PROCEDURE

CERTIFIED ACCURACY ± 1 % NIST TRACEABLE

CYLINDER PRESSURE 2000 PSIG

CERTIFICATION DATE 08/27/02

EXPIRATION DATE 08/27/04 TERM 24 MONTHS

CERTIFIED CONCENTRATION

NITRIC OXIDE	20.8 ppm
NITROGEN	BALANCE
NOx	21.0 ppm

ANALYZED BY

PHU TIEN NGUYEN

CERTIFIED BY

MICHAEL TSANG

IMPORTANT

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER HORIZON AIR

P.O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON MONOXIDE GMIS	vs. SRM#1689	SA 18494	50.0 ppm
NITRIC OXIDE GMIS	vs SRM#1683b	SA 10788	48.61 ppm

ANALYZER READINGS

R=REFERENCE STANDARD

Z=ZERO GAS

C=GAS CANDIDATE

1. COMPONENT CARBON MONOXIDE GMIS		ANALYZER MAKE-MODEL-S/N Siemens Ultramat 5E S/N A12-729	
ANALYTICAL PRINCIPLE NDIR		LAST CALIBRATION DATE 11/14/02	
FIRST ANALYSIS DATE 07/23/02		SECOND ANALYSIS DATE 11/21/02	
Z 0.0	R 50.6	C 50.3	CONC. 50.3
R 50.6	Z 0.0	C 50.3	CONC. 50.3
Z 0.0	C 50.3	R 50.6	CONC. 50.3
U/M ppm		MEAN TEST ASSAY 50.3 ppm	
2. COMPONENT NITRIC OXIDE GMIS		ANALYZER MAKE-MODEL-S/N Beckman 951A S/N 0101354	
ANALYTICAL PRINCIPLE Chemiluminescence		LAST CALIBRATION DATE 11/08/02	
FIRST ANALYSIS DATE 07/23/02		SECOND ANALYSIS DATE 11/21/02	
Z 0.0	R 429.0	C 417.2	CONC. 50.2
R 427.9	Z 0.0	C 416.7	CONC. 50.2
Z 0.0	C 416.0	R 429.8	CONC. 49.9
U/M mV		MEAN TEST ASSAY 50.1	

Values not valid below 150 psig.

NOx values for reference use only.

FIRST ANALYSIS OF CO USED GMIS# SA 17996 & NO USED NO GMIS# SA 13019.

THIS CYLINDER NO. SA 8852		CERTIFIED CONCENTRATION	
HAS BEEN CERTIFIED ACCORDING TO SECTION EPA-600/R97/121		CARBON MONOXIDE	50.4 ppm
OF TRACEABILITY PROTOCOL NO. Rev. 9/97		NITRIC OXIDE	50.0 ppm
PROCEDURE G1		NITROGEN	BALANCE
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE		NOx	50.1 ppm
CYLINDER PRESSURE 2000 PSIG			
CERTIFICATION DATE 11/21/02			
EXPIRATION DATE 11/21/04 TERM 24 MONTHS			

ANALYZED BY

CHRIS VU

CERTIFIED BY

EDGAR CUEVAS

IMPORTANT

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER HORIZON AIR MEASUREMENT

P.O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON MONOXIDE GMIS	vs. SRM#1679	CC 43032	99.1 ppm
NITRIC OXIDE GMIS	vsSRM1684b	SA 21535	100.3 ppm

ANALYZER READINGS

R=REFERENCE STANDARD

Z=ZERO GAS

C=GAS CANDIDATE

1. COMPONENT CARBON MONOXIDE GMIS		ANALYZER MAKE-MODEL-S/N		Siemens Ultramat 5R S/N A12-729	
ANALYTICAL PRINCIPLE NDIR		LAST CALIBRATION DATE		01/09/03	
FIRST ANALYSIS DATE 01/15/03		SECOND ANALYSIS DATE		01/21/03	
Z 0.0	R 99.1	C 79.3	CONC. 79.3	Z 0.0	R 99.1
R 99.1	Z 0.0	C 79.3	CONC. 79.3	R 99.1	Z 0.0
Z 0.0	C 79.3	R 99.1	CONC. 79.3	Z 0.0	C 79.2
U/M ppm		MEAN TEST ASSAY 79.3 ppm		U/M ppm	
2. COMPONENT NITRIC OXIDE GMIS		ANALYZER MAKE-MODEL-S/N		Beckman 951A S/N 0101354	
ANALYTICAL PRINCIPLE Chemiluminescence		LAST CALIBRATION DATE		01/08/03	
FIRST ANALYSIS DATE 01/15/03		SECOND ANALYSIS DATE		01/21/03	
Z 0.0	R 887.5	C 707.1	CONC. 79.9	Z 0.0	R 888.7
R 888.5	Z 0.0	C 708.5	CONC. 80.0	R 890.9	Z 0.0
Z 0.0	C 709.6	R 889.8	CONC. 80.0	Z 0.0	C 708.1
U/M mV		MEAN TEST ASSAY 80.0 ppm		U/M mV	

Values not valid below 150 psig.
NOx values for reference use only.

THIS CYLINDER NO.	CC 157902	CERTIFIED CONCENTRATION	
HAS BEEN CERTIFIED ACCORDING TO SECTION	EPA-600/R97/121	CARBON MONOXIDE	79.2 ppm
OF TRACEABILITY PROTOCOL NO.	Rev. 9/97	NITRIC OXIDE	80.0 ppm
PROCEDURE	G1	NITROGEN	BALANCE
CERTIFIED ACCURACY	± 1 % NIST TRACEABLE	NOx	80.0 ppm
CYLINDER PRESSURE	2000 PSIG		
CERTIFICATION DATE	01/21/03		
EXPIRATION DATE	01/21/05	TERM	24 MONTHS

ANALYZED BY

CHRIS VU

CERTIFIED BY

EDGAR CUEVAS

IMPORTANT

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

CERTIFICATE OF ANALYSIS**CUSTOMER** HORIZON AIR MEASUREMENTS**DATE** 03/31/03**P.O NUMBER** 8156**REF. NUMBER** 89360800**REQUESTED COMPOSITION**

GAS	CONCENTRATION
CARBON DIOXIDE	7%
OXYGEN	12%
NITROGEN	BALANCE
ANALYTICAL ACCURACY	± 1 %

ANALYTICAL METHOD

INSTRUMENT	ANALYTICAL PRINCIPLE
METTLER ID5, S/N:1865166	GRAVIMETRIC
METTLER ID5, S/N:1865166	GRAVIMETRIC

VALUES NOT VALID BELOW 150 PSIG.

THIS CYLINDER NO.	CC 163394
CYLINDER PRESSURE	2000 PSIG
EXPIRATION DATE	03/28/06
CLASSIFICATION	PRIMARY STANDARD
BATCH NUMBER	N/A
LOT NUMBER	109308406
PART NUMBER	EV NICDOXP1-AS
CYLINDER SIZE	AS CGA 590 148 CFT

CERTIFIED CONCENTRATION

CARBON DIOXIDE	7.00%
OXYGEN	12.01%
NITROGEN	BALANCE
ANALYTICAL ACCURACY	± 1 %

ANALYZED BY

EDGAR CUEVAS

CERTIFIED BY

PHU TIEN NGUYEN

IMPORTANT

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

CERTIFICATE OF ANALYSIS**CUSTOMER** HORIZON AIR**DATE** 08/27/02**P.O NUMBER****REF. NUMBER** 00874800**REQUESTED COMPOSITION**

GAS	CONCENTRATION
CARBON DIOXIDE	12 %
NITROGEN	BALANCE
ANALYTICAL ACCURACY	± 1 %

ANALYTICAL METHOD**INSTRUMENT**
METTLER ID5, S/N:1865166**ANALYTICAL PRINCIPLE**
GRAVIMETRIC

VALUE NOT VALID BELOW 150 PSIG.

THIS CYLINDER NO.	SA 2515
CYLINDER PRESSURE	2000 PSIG
EXPIRATION DATE	08/27/05
CLASSIFICATION	PRIMARY STANDARD
BATCH NUMBER	N/A
LOT NUMBER	109223508
PART NUMBER	EV NICD12P-AS
CYLINDER SIZE	AS CGA 580 143 CFT

CERTIFIED CONCENTRATION

CARBON DIOXIDE	12.01 %
NITROGEN	BALANCE
ANALYTICAL ACCURACY	± 1 %

ANALYZED BY

JOSEPH CHARLES

CERTIFIED BY

TY TRIPLETT

IMPORTANT

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

Magnehelic Gauge Calibration Data

Range: 0.0-1.0

Date: 02/17/03

Calibrated by: Travis Williams

BAROMETRIC PRESURE: 29.40

Reference: 0.0-10.0" MANOMETER

SYSTEM

LEAK CHECKS (Y/N): Y

POINT

LEAK CHECK (Y/N): Y

Magnehelic Box # 1

Serial # R970865M62

MAG	MAN R1	MAN R2	MAN R3	MEAN	MEAN/MAG
0.20	0.20	0.20	0.20	0.200	0.998
0.40	0.40	0.40	0.40	0.400	0.999
0.60	0.60	0.60	0.60	0.599	0.999
0.80	0.80	0.80	0.80	0.800	1.000
1.00	1.00	1.00	1.00	1.000	1.000

Correction Factor:

0.9992

Date: 02.17.03

Checked by: 

Control Box Calibration Data

Date: 01/29/03

Calibrated by: FJOTorres

Meter Box Number: 4

Barometric Pressure: 29.31

Wet Test Meter Cf: 1.0013

Orifice setting (H)	Gas Volumes			Temperatures			Time (min)	Y	H@
	Wet Test (cu.ft)	Dry Gas Initial (cu.ft)	Dry Gas Final (cu.ft)	DGM Initial (°F)	DGM final (°F)	WTM (°F)			
0.5	6.200	719.365	725.627	69	70	71	15	0.9873	1.6812
1.0	5.788	737.182	743.028	70	71	71	10	0.9870	1.7131
1.5	10.335	725.907	736.320	69	71	71	15	0.9877	1.8142
2.0	18.346	680.992	699.487	71	73	71	23	0.9892	1.7989
3.0	14.536	666.152	680.763	69	73	71	15	0.9883	1.8307
4.0	19.350	646.527	665.885	65	72	71	17	0.9858	1.7777
AVERAGE								0.9876	1.7693

Reviewed by:



Date: 02/05/03

Calibrated by: FJOTorres

Meter Box Number: 5

Barometric Pressure: 29.30

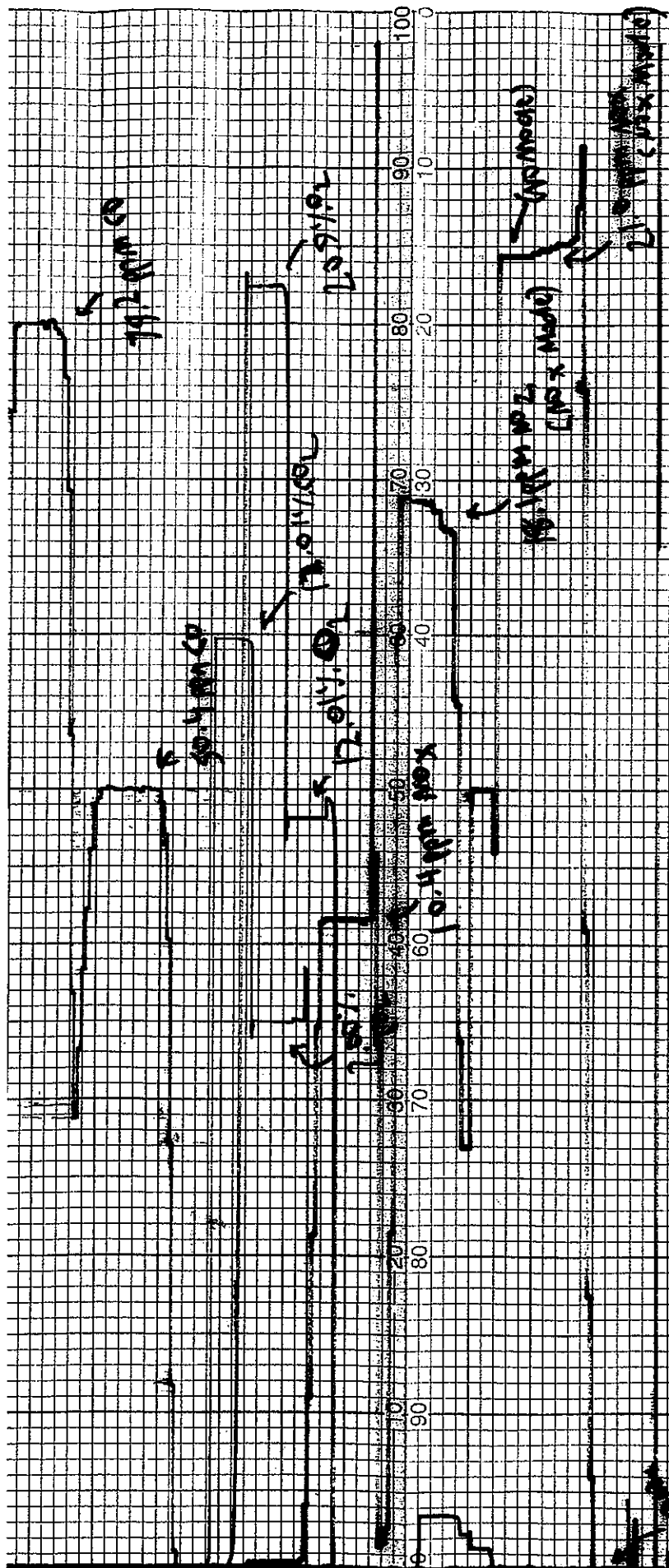
Wet Test Meter Cf: 1.0013

Orifice setting (H)	Gas Volumes			Temperatures			Time (min)	Y	H@
	Wet Test (cu.ft)	Dry Gas Initial (cu.ft)	Dry Gas Final (cu.ft)	DGM Initial (°F)	DGM final (°F)	WTM (°F)			
0.5	7.054	436.875	444.083	67	76	65	17	0.9903	1.6258
1.0	19.763	504.138	524.342	69	77	66	34	0.9891	1.6595
1.5	13.236	524.559	538.157	77	80	67	19	0.9913	1.7218
2.0	16.216	474.603	491.257	73	79	66	20	0.9876	1.6962
3.0	11.951	461.997	474.270	71	78	66	12	0.9829	1.6903
4.0	16.120	445.166	461.642	69	77	66	14	0.9824	1.6908
AVERAGE								0.9873	1.6807

Reviewed by:



APPENDIX F - Strip Chart Data



Waste Water
Grinding Lt
Clack #2
Sun Valley, CA
4/22/03
0A 30 PM GSM

18.1 ppm NO2 (45 max) - SA15361
12.4 ppm NOx - CC155048
21.0 ppm NOx - SA7833
50.4 ppm CO / 50.1 ppm NOx - SA8852
79.2 ppm CO / 80.0 ppm NOx - CC157502
7.00% CO2 / 12.01% O2 - CC183394
12.01% CO2 - SA2515

CHART NO 201-01-25-20M

070

(JESS)

0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0

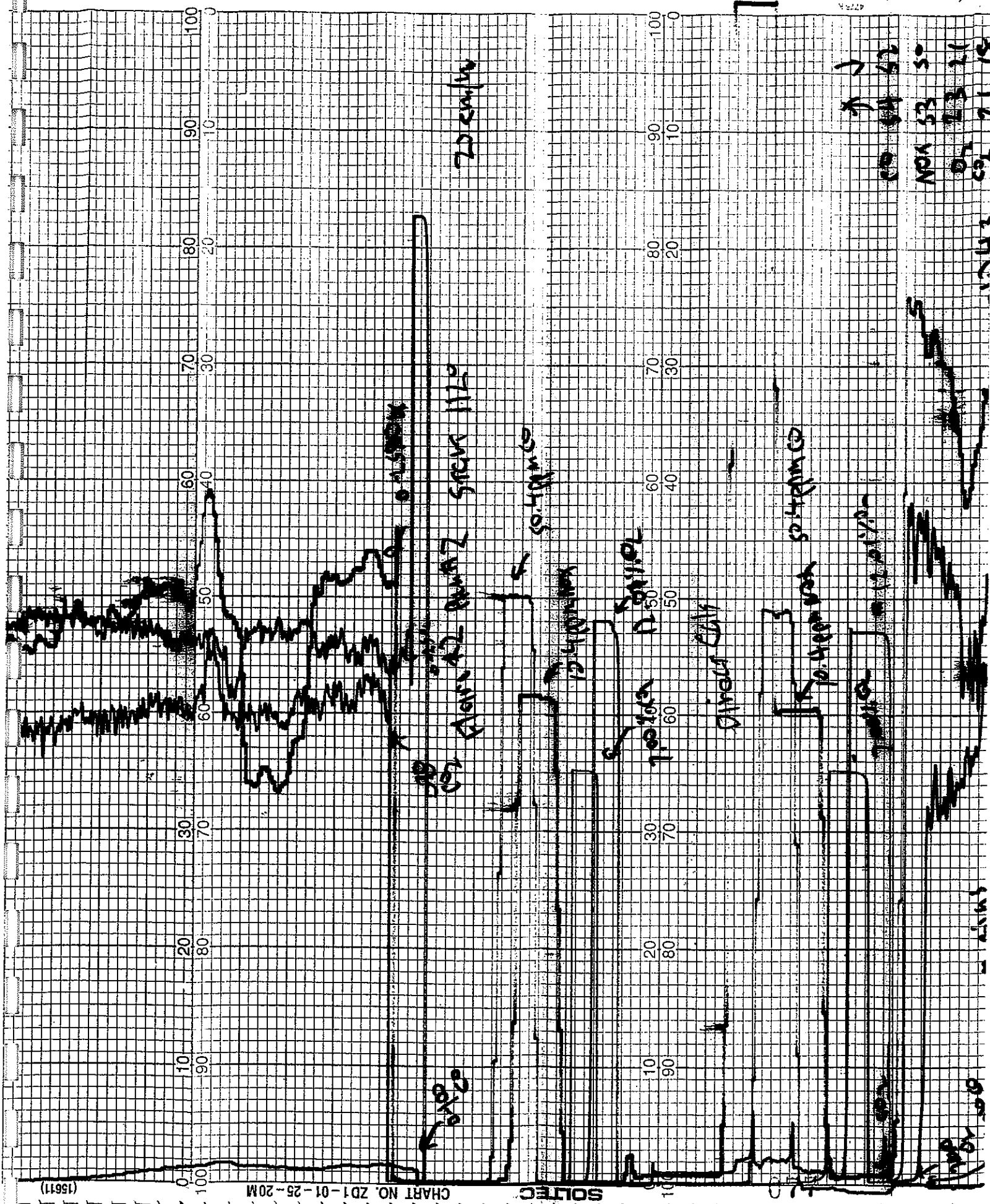
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0

57.5*10 CHAS

STOP 1043

START 1013

NOA	33	50
O ₂	23	21
CO ₂	21	18



CON 21 18

600 1233

600 1233

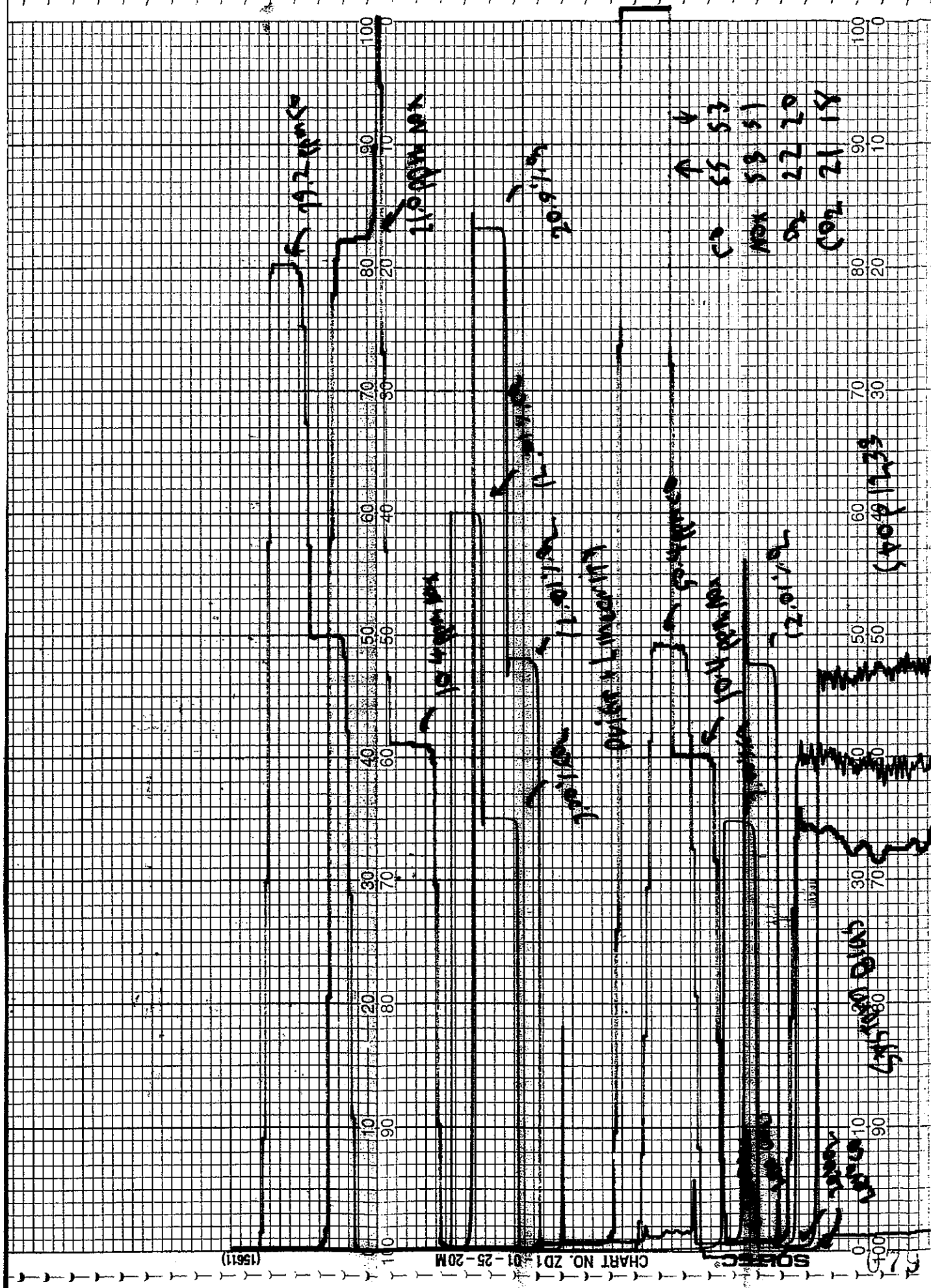
600 1203

600 1150

073

(15611)





APPENDIX G - Process Data

OPERATING DATA FOR LANDFILL FLARES

Facility: Bradley Landfill
 Job No.: W07-035
 Source: Flare #2

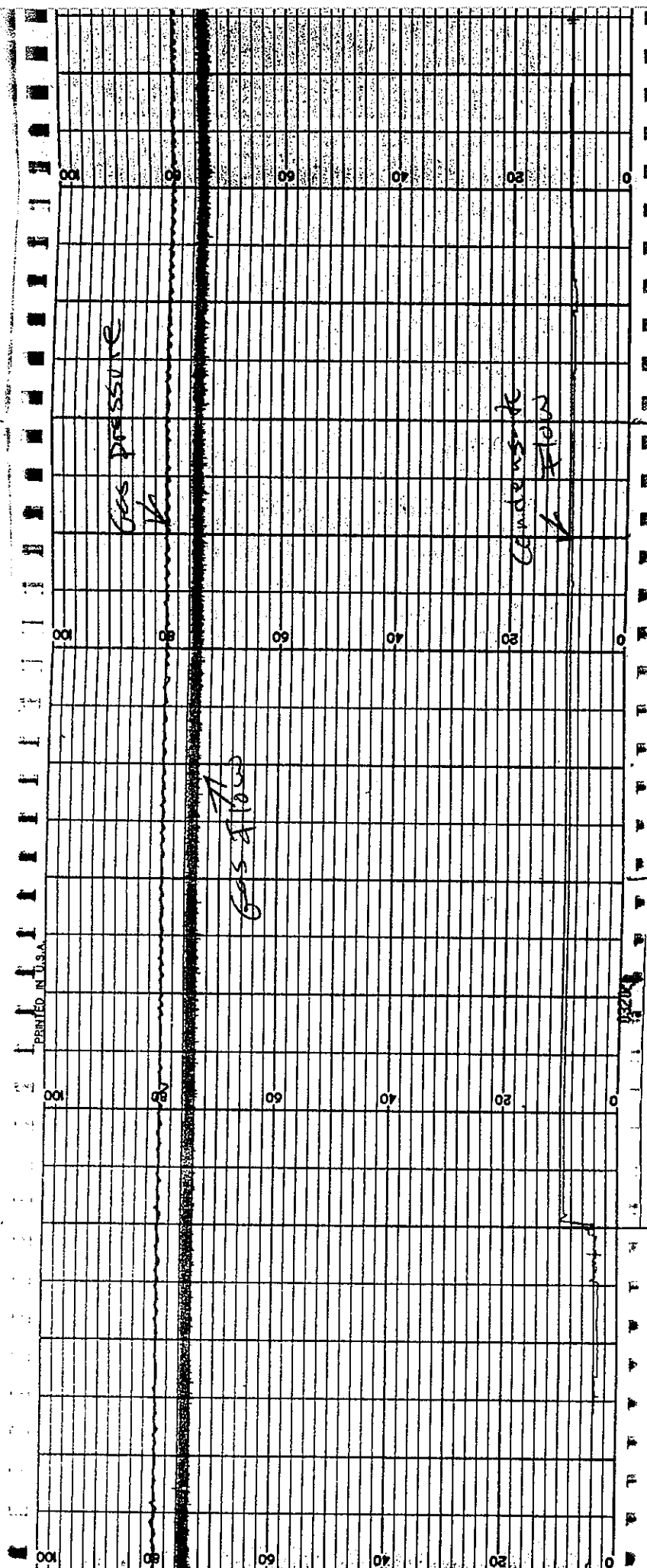
Date: 4/22/03
 Run #: 1, 2

Time Run #1	Landfill Gas Flow (SCFM)	Condensate Injection (GPM)	Flare Temperature (°F)	Fuel Pressure ()	Fuel Temp (°F)
0920	1701	1.2	1580	NA	NA
0930	1699	1.2	1588		
0940	1707	1.2	1591		
0950	1702	1.2	1587		
1000	1708	1.2	1587		
1020	1709	0.0	1603		
1030	1703	0.0	1608		
Run #2					
1030	1707	1.6	1591		
1140	1693	1.6	1588		
1150	1657	1.5	1587		
1200	1694	1.5	1589		
1210	1676	1.5	1588		
1220	1700	0.0	1583	↓	↓

1,697

1.05

1590



09:00 AM

04/22/03

09:16

APPENDIX H - Permit to Operate



PERMIT TO OPERATE

Ses-Fs
am Plast

page 1
Permit No.
F27480
A/N 288680

This initial permit must be renewed ANNUALLY unless the equipment is moved, or changes ownership.
If the billing for annual renewal fee (Rule 301.f) is not received by the expiration date, contact the District.

05-10-009043558-PH1

**LEGAL OWNER
OR OPERATOR:**

BRADLEY LANDFILL AND RECYCLING CENTER
9081 TUJUNGA AVE P O BOX 39
SUN VALLEY, CA 91352

ID 050310

Equipment Location: 9227 TUJUNGA AVE, SUN VALLEY, CA 91352-1542

Equipment Description:

LANDFILL GAS FLARING SYSTEM NO. 2 CONSISTING OF:

1. INLET SEPARATOR, LANDFILL GAS, TEXAS PIPE FABRICATORS, 2'-6" DIA. X 13'-7" H.
2. PARTICULATE SCRUBBER, LANDFILL GAS, TEXAS PIPE FABRICATORS, 2'-6" DIA. X 9'-3" H.
3. TWO BLOWERS, LANDFILL GAS, EACH 30 H.P., 2083 SCFM MAXIMUM.
4. FLARE NO. 2, JOHN ZINK, 8'-0" DIA. X 50'-0" H., WITH A MULTI-JET BURNER, A PROPANE GAS PILOT, ELECTRIC IGNITER, UV FLAME SENSOR, THERMOCOUPLE WITH TEMPERATURE INDICATOR AND RECORDER, AUTOMATIC SHUTDOWN AND ALARM SYSTEM, AUTOMATIC COMBUSTION AIR REGULATING SYSTEM, TEMPERATURE CONTROLLER, FLAME ARRESTOR AND FIVE CONDENSATE INJECTION GUNS

Conditions:

- 1) OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN ACCORDANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.
- 2) THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.
- 3) THIS EQUIPMENT SHALL BE OPERATED AND MAINTAINED BY PERSONNEL PROPERLY TRAINED IN ITS OPERATION.
- 4) THE FLARE SHALL BE EQUIPPED WITH A TEMPERATURE INDICATOR AND RECORDER WHICH MEASURES AND RECORDS THE GAS TEMPERATURE (IN DEGREES F) IN THE FLARE STACK. THE TEMPERATURE INDICATOR AND RECORDER SHALL OPERATE WHENEVER THE FLARE IS IN OPERATION.

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**PERMIT TO OPERATE****CONTINUATION OF PERMIT TO OPERATE**

- 5) WHENEVER THE FLARE IS IN OPERATION, EXCEPT DURING START-UP, A TEMPERATURE OF NOT LESS THAN 1400 DEGREES F, AS MEASURED BY THE TEMPERATURE INDICATOR AND RECORDER, SHALL BE MAINTAINED IN THE FLARE STACK. THE THERMOCOUPLE USED TO MEASURE THE TEMPERATURE SHALL BE ABOVE THE FLAME ZONE AND AT LEAST 3 FEET BELOW THE TOP OF THE FLARE SHROUD AND AT LEAST 0.6 SECONDS DOWNSTREAM OF THE BURNER.
- 6) A FLOW INDICATING AND RECORDING DEVICE SHALL BE MAINTAINED IN THE LANDFILL GAS SUPPLY LINE TO THE FLARE TO MEASURE AND RECORD THE QUANTITY OF LANDFILL GAS (IN SCFM) BEING BURNED.
- 7) THE TOTAL VOLUME OF LANDFILL GAS BURNED IN THE FLARE SHALL NOT EXCEED 2,083 CUBIC FEET PER MINUTE.
- 8) WHENEVER THE CONDENSATE INJECTION STATION IS IN OPERATION, NOT MORE THAN 5 GALLONS PER MINUTE OF CONDENSATE SHALL BE INJECTED INTO THE FLARE.
- 9) A FLOW INDICATOR AND RECORDER SHALL BE INSTALLED IN THE CONDENSATE INJECTION STATION AND SHALL OPERATE WHENEVER THE CONDENSATE INJECTION STATION IS IN OPERATION.
- 10) ALL RECORDING DEVICES SHALL BE SYNCHRONIZED WITH RESPECT TO THE TIME OF DAY.
- 11) THE FLARE SHALL BE EQUIPPED WITH A FLARE FAILURE ALARM WITH AN AUTOMATIC BLOWER SHUT-OFF SYSTEM.
- 12) THE FLARE FAILURE ALARM WITH THE AUTOMATIC BLOWER SHUT-OFF SYSTEM SHALL BE TESTED ANNUALLY FOR PROPER OPERATION AND RESULTS RECORDED.
- 13) A PRESSURE DIFFERENTIAL INDICATOR SHALL BE MAINTAINED ACROSS THE FLAME ARRESTOR.
- 14) A SUFFICIENT NUMBER OF SIGHT GLASS WINDOWS SHALL BE INSTALLED IN THE FLARE TO ALLOW VISUAL INSPECTION OF THE FLAME AND THERMOCOUPLE LOCATION WITHIN THE FLARE AT ALL TIMES. ADEQUATE AND SAFE ACCESS SHALL BE PROVIDED FOR ALL PORTS UPON REQUEST BY AQMD PERSONNEL.
- 15) A SET OF FOUR SAMPLING PORTS SHALL BE INSTALLED IN THE FLARE SHROUD AND LOCATED AT LEAST TWO FEET ABOVE THE FLAME ZONE AND AT LEAST THREE FEET BELOW THE TOP OF THE FLARE SHROUD. EACH PORT SHALL BE INSTALLED AT 90 DEGREES APART AND SHALL CONSIST OF FOUR INCH COUPLINGS. ADEQUATE AND SAFE ACCESS TO ALL TEST PORTS SHALL BE PROVIDED BY THE APPLICANT WITHIN 24 HOURS OF A REQUEST BY THE AQMD TO CONDUCT A TEST.
- 16) A SAMPLING PORT, OR OTHER METHOD APPROVED BY THE AQMD, SHALL BE INSTALLED AT THE INLET GAS LINE TO THE FLARE.

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**PERMIT TO OPERATE****CONTINUATION OF PERMIT TO OPERATE**

- 17) THE APPLICANT SHALL CONDUCT A SOURCE TEST ANNUALLY OR PER THE APPROVED 1150.1 COMPLIANCE PLAN. THE TEST SHALL BE PERFORMED IN ACCORDANCE WITH AQMD APPROVED TEST PROCEDURES. THE TEST SHALL INCLUDE, BUT MAY NOT BE LIMITED TO, A TEST OF THE FLARE FOR:
- A. LANDFILL GAS COMPOSITION AND HEATING VALUE.
 - B. LANDFILL GAS FLOW RATE, SCFM (INLET)
 - C. TOTAL SULFUR COMPOUNDS AS H₂S, PPMV (INLET)
 - D. TEMPERATURE, F (EXHAUST)
 - E. FLOW RATE, DSCFM (EXHAUST)
 - F. NO_x, LBS/HR AND LBS/MMBTU (EXHAUST)
 - G. SO_x, LBS/HR (EXHAUST)
 - H. CO, LBS/HR (EXHAUST)
 - I. PM, LBS/HR AND GR/DSCF (EXHAUST)
 - J. TOTAL NON-METHANE ORGANICS, LBS/HR, INLET AND EXHAUST
 - K. RULE 1150.1 TOXIC COMPOUNDS, PPMV, INLET AND EXHAUST
- 18) EMISSIONS OF NO_x FROM THE FLARE SHALL NOT EXCEED 0.06 LBS MILLION BTU OF HEAT.
- 19) THE SKIN TEMPERATURE OF THE FLARE SHROUD WITHIN FOUR FEET OF ALL THE SOURCE TEST PORTS SHALL NOT EXCEED 250 DEGREES F. IF A HEAT SHIELD IS REQUIRED TO MEET THIS REQUIREMENT, ITS DESIGN SHALL BE APPROVED BY THE AQMD PRIOR TO CONSTRUCTION. THE HEAT SHIELD, IF REQUIRED TO MEET THE TEMPERATURE REQUIREMENT, SHALL BE IN PLACE WHENEVER A SOURCE TEST IS CONDUCTED BY THE DISTRICT.
- 20) ANY BREAKDOWN OR MALFUNCTION OF THE LANDFILL GAS FLARE STATION RESULTING IN THE EMISSION OF RAW LANDFILL GAS SHALL BE REPORTED TO THE AQMD WITHIN ONE HOUR OF OCCURRENCE, AND IMMEDIATE REMEDIAL MEASURES SHALL BE UNDERTAKEN TO CORRECT THE PROBLEM AND PREVENT FURTHER EMISSIONS INTO THE ATMOSPHERE.
- 21) EMISSIONS RESULTING FROM FLARE NO. 3 SHALL NOT EXCEED THE FOLLOWING:
- ROG 0.66 LBS/HR
 - NO_x 2.58 LBS/HR
 - SO_x 3.16 LBS/HR
 - CO 2.37 LBS/HR
 - PM₁₀ 1.31 LBS/HR
- 22) ALL RECORDS SHALL BE KEPT FOR A PERIOD OF AT LEAST TWO (2) YEARS AND SHALL BE MADE AVAILABLE TO AQMD PERSONNEL UPON REQUEST. A RECORD OF THE HOURS OF FLARE OPERATION SHALL BE INCLUDED.
- 23) FLARE START-UP TIME SHALL NOT EXCEED 30 MINUTES. ANY OUTAGE THAT RESULTS IN THE SHUTDOWN OF THE FLARE SHALL NOT BE CONSIDERED A BREAKDOWN PROVIDING NO EMISSION OF RAW LANDFILL GAS OCCURS.
- 24) MITIGATION MEASURES, OTHER THAN THOSE INDICATED IN THESE CONDITIONS, WHICH ARE DEEMED APPROPRIATE BY AQMD PERSONNEL AS NECESSARY TO PROTECT THE COMFORT, REPOSE, HEALTH OR SAFETY OF THE PUBLIC, SHALL BE IMPLEMENTED UPON REQUEST.

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PERMIT TO OPERATE

Permit No.
F27480
A/N 288680

CONTINUATION OF PERMIT TO OPERATE

NOTICE

IN ACCORDANCE WITH RULE 206, THIS PERMIT TO OPERATE OR COPY SHALL BE POSTED ON OR WITHIN 8 METERS OF THE EQUIPMENT.

THIS PERMIT DOES NOT AUTHORIZE THE EMISSION OF AIR CONTAMINANTS IN EXCESS OF THOSE ALLOWED BY DIVISION 26 OF THE HEALTH AND SAFETY CODE OF THE STATE OF CALIFORNIA OR THE RULES OF THE AIR QUALITY MANAGEMENT DISTRICT. THIS PERMIT CANNOT BE CONSIDERED AS PERMISSION TO VIOLATE EXISTING LAWS, ORDINANCES, REGULATIONS OR STATUTES OF OTHER GOVERNMENT AGENCIES.

EXECUTIVE OFFICER

Dorris M. Bailey

By Dorris M. Bailey/tk01
4/11/2000

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